OIL TRANSPORTATION AND CLEANUP TECHNOLOGY

HEARING

BEFORE THE

SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS

OF THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

MAY 24, 1990

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OIL TRANSPORTATION AND CLEANUP TECHNOLOGY

THURSDAY, MAY 24, 1990

U. S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:36 a.m., in room 2325, Rayburn House Office Building, Hon. Robert G. Torricelli [chairman of the subcommittee] presiding.

Mr. TORRICELLI. The meeting will come to order, please.

We'd like to extend a welcome to our witnesses, members, and guests and thank them for their attendance here today in a hearing called on the question of Oil Transportation and Cleanup Technology. Our view, of course, is to take a look at the alternate technologies that exist or should be explored in the future to the movement of oil supplies in and around the United States. I am particularly glad that we were able to get the cooperation of so many knowledgeable witnesses to participate in today's hearing.

One of the most promising answers to the question of the movement of oil of course has been known for decades. In study after study double bottoms and double hulls for oil tankers have been cited as a major factor necessary to improve the safety of the world's oil fleet. Time and again this remedy has been proposed in different Administrations by different agencies of the Federal Government, and time and again some of those in the industry have dodged this potential bullet by lobbying against these proposals with an intensity and a vigor that are remarkable. It is also notable that some in the industry have now seen the wisdom or have the courage to make the change themselves without Federal regulation or action. Therefore there seems to be some apparent shift in the industry.

It is this difference between the research, different positions taken through the years, and now some internal conflict in the industry that has led to the interest in having this hearing to see whether or not further Federal research or actions are required, or whether the industry is inevitably taking action itself.

The battle over double hulls has played itself out in the waters off Alaska, of course, with a tragic plot the last year. What is interesting about those events is that in 1982 [sic], officials of the Nixon Administration promised that tankers moving oil out of Alaska would have the latest safety features, including double bottoms or

double hulls. In 1973 the United States Coast Guard proposed double bottoms as the standard for ocean-going tankers. Then again, in 1977, President Carter called for mandatory double bottoms following a series of tanker accidents in American waters.

The story ends, as many tragedies do, in the same place that it began, in Alaska. In this case it was off the coast of Alaska. It is interesting to note that had President Carter's position at that time prevailed, the Exxon Valdez would have been a double bottomed ship and, according to Coast Guard figures, would have spilled considerably less oil than actually occurred. Indeed, while a second skin might have been breached, far less oil apparently would have entered the waters of Alaska.

Now we revisit the issue again after so many statements, so many conflicting positions, so many lost opportunities. Indeed, one of the great tragedies in oil transportation, and in these oil spills, is that the hearing has been necessary at all. This is an issue that should have been decided years or decades ago. So much cost has been incurred and so much damage has been done because, despite evidence, a decision has failed to have been made.

So here we are again to face the issue once again hoping that either within the industry or within the powers of the Federal Government we finally can reach some conclusion.

I thank each of our witnesses for coming and for hearing my opening comments, neutral though they might appear on the issue—

[Laughter.]

Mr. TORRICELLI.—and for giving us the benefit of their testimony.

For our first presentation, we will hear from the Maritime Administration and from the Coast Guard. Representing the Coast Guard we have Captain David Whitten, Acting Chief of Marine Safety; and for the Maritime Administration, Richard Bowman.

I understand that you have each prepared statements which of course will be entered into the record. I would at this time, however, invite you to give whatever summary you'd like to provide for the Committee.

Captain?

Captain WHITTEN. Thank you very much and good morning, Mr. Chairman.

Mr. TORRICELLI. I understand, Mr. Walker, you did not want to make an opening statement. Is that right?

Mr. WALKER. That is correct.

Mr. TORRICELLI. You may proceed, Captain.

STATEMENT OF CAPTAIN DAVID H. WHITTEN, ACTING CHIEF OF MARINE SAFETY, SECURITY AND ENVIRONMENTAL PROTECTION, UNITED STATES COAST GUARD; ACCOMPANIED BY: CAPTAIN JAMES MAC DONALD, CHIEF, MERCHANT VESSEL INSPECTION AND DOCUMENTATION DIVISION, AND COMMANDER WILLIAM HOLT, ASSISTANT CHIEF, MARINE ENVIRONMENTAL RESPONSE DIVISION

Captain WHITTEN. I am Captain David Whitten, Deputy Chief of the Office of Marine Safety, Security and Environmental Protection. Today I have with me Captain James MacDonald, Chief of our

Merchant Vessel Inspection and Documentation Division, and Commander William Holt, Assistant Chief of our Marine Environmental Response Division. With your permission I will summarize. My statement is submitted in full for the record.

Mr. TORRICELLI. Thank you, Captain.

Captain WHITTEN. We appreciate the opportunity to address the issue of oil transportation safety as it relates to the Coast Guard's Marine Safety and Environmental Protection Programs. These programs are integrated and undergo continuous examination. We have a system in place which emphasizes pollution prevention, and we have been in the business of oil spill response and cleanup for over 20 years. In broad terms, our systems approach covers the construction and maintenance of vessels, their proper manning by qualified crews, the equipment needed to safely handle oil cargoes, and the proper navigation of the vessels.

The Coast Guard provides one of the most modern aids to navigation systems in the world, which includes vessel traffic services. We investigate marine casualties, including oversight of the conduct of licensed officers and documented seamen. And we administer a civil penalty system for violations. Each of our 48 captains of the port maintains an oil and hazardous chemical spill contingency plan for his zone of responsibility. We maintain the national strike force, one team located near San Francisco, California and another in Mobile, Alabama. Their equipment is ready to be delivered by Coast Guard aircraft anywhere in the United States.

This systems approach worked well for us until, as you said, the catastrophic Exxon Valdez grounding. In the aftermath of that casualty, we began a thorough investigation into every aspect of our system to see where improvements could be made. We have looked at ship operations, vessel inspections, personnel, navigation systems, port control procedures, and our available response equipment. We have international conventions for the prevention of pollution from ships of 1973 and their follow on protocols. The Safety of Life at Sea convention in 1974—these conventions developed significant new requirements for tank ships that have been incorporated into our regulations.

The Coast Guard has several tanker safety related regulatory initiatives under way. I won't go into detail. They are listed in my written statement.

The Coast Guard has initiated studies to enhance our oil spill prevention and response capability. One study will compare and contrast the feasibility and technical risks of different methods of mechanical recovery of oil from the oceans. Another will develop criteria to upgrade the response equipment for our strike team.

We are working jointly with Environment Canada and the U.S. Minerals Management Service on projects such as in situ burning and thickness sensors. We are considering future research and development projects covering damaged vessel countermeasures, development of a response organization to deal with incidents of national significance, oil spill recovery systems, and multi-agency hazardous spill countermeasures.

The Coast Guard strongly supports the legislative enhancement of the existing Federal response mechanism that has been successful for more than 18 years because it retains the on scene coordina-

tor as the single person in charge. The on scene coordinator is supported by a readily identifiable chain of command and is the immediate focus for coordination of all spill activities. We also support the retention of the cleanup regime that has the responsible party conduct the cleanup in most cases with the added provisions that allows the on scene coordinator to direct persons on scene.

We have commissioned a study by the National Academy of Sciences to investigate the design of tankers and ocean going tank barges. This is the first comprehensive study of construction features for preventing accidental pollution that has been undertaken for many years.

Presently new tankers are required to have protectively located segregated ballast tanks. Their ballast tanks are located to shield a percentage of their cargo tanks from the hull in critical locations. The NAS study should provide us with an evaluation of the effectiveness of this design arrangement and should produce a list of tanker design measures that hold promise for further reducing pollution risks. It will also identify any deficiencies in current proposals that could negate perceived benefits. The Coast Guard is looking forward to the results of this study which is expected to be completed in December of this year.

Mr. Chairman, this concludes the summary of my statement. I will be glad to answer any questions that you or the other members of the Subcommittee may have.

[The prepared statement of Captain Whitten follows:]

U.S. Department of Transportation
United States Coast Guard

MAILING ADDRESS:
Commandant
United States Coast Guard

DEPARTMENT OF TRANSPORTATION

U. S. COAST GUARD

PREPARED STATEMENT OF CAPTAIN DAVID H. WHITTEN

DEPUTY CHIEF, OFFICE OF MARINE SAFETY, SECURITY AND ENVIRONMENTAL PROTECTION

ON OIL TRANSPORTATION SAFETY

TO BE PRESENTED BEFORE THE HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS

MAY 24, 1990

DEPARTMENT OF TRANSPORTATION
U.S. COAST GUARD
STATEMENT OF CAPTAIN DAVID H. WHITTEN, USCG
ON OIL TRANSPORTATION SAFETY
HOUSE OF REPRESENTATIVES SUBCOMMITTEE ON TRANSPORTATION,
AVIATION, AND MATERIALS
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
24 MAY 1990

THANK YOU VERY MUCH AND GOOD MORNING MR. CHAIRMAN. I AM CAPTAIN DAVID WHITTEN, AND I AM CURRENTLY SERVING AS DEPUTY CHIEF OF THE OFFICE OF MARINE SAFETY, SECURITY AND ENVIRONMENTAL PROTECTION. TODAY I HAVE WITH ME CAPTAIN JAMES MACDONALD, CHIEF OF THE MERCHANT VESSEL INSPECTION AND DOCUMENTATION DIVISION, AND COMMANDER WILLIAM HOLT, ASSISTANT CHIEF OF THE MARINE ENVIRONMENTAL RESPONSE DIVISION. I WILL SUMMARIZE MY FULL STATEMENT WHICH I WILL BE SUBMITTING FOR INCLUSION IN THE RECORD.

I APPRECIATE THE OPPORTUNITY TO ADDRESS THIS COMMITTEE ON THE ISSUE OF "OIL TRANSPORTATION SAFETY" AS IT RELATES TO THE COAST GUARD'S NATIONAL MARINE SAFETY AND ENVIRONMENTAL PROTECTION PROGRAMS. THESE PROGRAMS ARE INTEGRATED SYSTEMS THAT UNDERGO CONTINUOUS EXAMINATION, AND IT IS THE COAST GUARD'S PHILOSOPHY THAT THE PREVENTION OF OIL SPILLS IS OF PRIMARY IMPORTANCE. THE COAST GUARD HAS BEEN IN THE BUSINESS OF OIL SPILL RESPONSE AND CLEANUP FOR OVER TWENTY YEARS. DURING THAT TIME WE HAVE PUT INTO PLACE A SYSTEM, NOT ONLY TO RESPOND TO SPILLS, BUT ALSO TO PREVENT THEM FROM HAPPENING IN THE FIRST PLACE. IN BROAD TERMS, THIS SYSTEMS APPROACH COVERS THE CONSTRUCTION AND MAINTENANCE OF VESSELS, THEIR PROPER MANNING BY QUALIFIED CREWS, AND THE NECESSARY EQUIPMENT TO SAFELY HANDLE OIL CARGOES AND TO NAVIGATE THE VESSELS.

THE COAST GUARD PROVIDES ONE OF THE MOST MODERN AIDS TO NAVIGATION SYSTEMS IN THE WORLD, INCLUDING VESSEL TRAFFIC SERVICES. WE INVESTIGATE ALL MARINE CASUALTIES AS DEFINED BY REGULATION, TO DETERMINE THEIR CAUSE, INCLUDING OVERSIGHT OF THE CONDUCT OF LICENSED OFFICERS AND DOCUMENTED SEAMEN, AND WE ADMINISTER A CIVIL PENALTY SYSTEM FOR VIOLATIONS. THE COAST GUARD'S 48 CAPTAINS OF THE PORT MAINTAIN AN OIL AND HAZARDOUS CHEMICAL CONTINGENCY PLAN FOR THEIR ZONE OF RESPONSIBILITY. WE MAINTAIN THE NATIONAL STRIKE FORCE, CONSISTING OF TWO TEAMS LOCATED NEAR SAN FRANCISCO, CALIFORNIA, AND IN MOBILE, ALABAMA. EQUIPMENT IS READY TO BE DELIVERED BY COAST GUARD HC-130 AIRCRAFT ANYWHERE IN THE U.S. THESE TEAMS ARE MANNED BY PEOPLE WITH EXTENSIVE EXPERIENCE IN SPILL RESPONSE AND MANAGEMENT. THEY AUGMENT OUR CAPTAINS OF THE PORT, THE PREDESIGNATED ON-SCENE COORDINATORS (OSC) FOR ALL SPILLS IN THE COASTAL REGIONS, THE GREAT LAKES, AND MANY INLAND RIVER AREAS. EACH YEAR WE RESPOND TO ABOUT 8,000 REPORTED SPILLS RANGING IN SIZE FROM A SHEEN TO SPILLS GREATER THAN 100,000 GALLONS.

THIS SYSTEMS APPROACH WORKED WELL FOR US UNTIL THE CATASTROPHIC EXXON VALDEZ GROUNDING AND RELEASE OF OVER 10 MILLION GALLONS OF OIL INTO THE WATERS OF PRINCE WILLIAM SOUND. IN THE AFTERMATH OF THE EXXON VALDEZ CASUALTY, WE BEGAN AN EXHAUSTIVE EFFORT TO INVESTIGATE EVERY ASPECT OF OUR SYSTEM TO SEE WHAT COULD BE DONE TO IMPROVE IT. WE HAVE LOOKED AT OPERATIONAL ISSUES, INSPECTION/ENFORCEMENT, PERSONNEL, NAVIGATION SYSTEMS, PORT CONTROL POLICIES AND PROCEDURES AS WELL AS EQUIPMENT. ATTENTION AGAIN HAS BEEN FOCUSED ON THE DESIGN AND

ARRANGEMENT OF TANK VESSEL CARGO AND BALLAST SYSTEMS TO MINIMIZE THE AMOUNT OF ACCIDENTAL POLLUTION, ISSUES WHICH HAVE BEEN THE SUBJECT OF INTERNATIONAL DISCUSSIONS AND AGREEMENTS SINCE THE EARLY 1970'S BY THE INTERNATIONAL MARITIME ORGANIZATION (IMO).

THOSE DISCUSSIONS IN EARLY 1970 LED TO THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS IN 1973 (MARPOL 73). FOLLOW ON PROTOCOLS IN 1978 AMENDED MARPOL 73 AND SAFETY OF LIFE AT SEA (SOLAS) 74. THESE CONVENTIONS DEVELOPED TANKER REQUIREMENTS THAT INCLUDED PROTECTIVELY LOCATED SEGREGATED BALLAST TANKS, CARGO TANK SIZE LIMITATIONS, DAMAGE STABILITY, INERT GAS SYSTEMS, ADDITIONAL NAVIGATION SAFETY EQUIPMENT, CRUDE OIL WASHING SYSTEMS, DEDICATED CLEAN BALLAST TANKS, AND OPERATIONAL DISCHARGE CRITERIA WITH MONITORING CONTROL SYSTEMS. ALL OF THESE REQUIREMENTS HAVE BEEN INCORPORATED INTO COAST GUARD REGULATIONS.

CURRENTLY THE COAST GUARD HAS APPROXIMATELY 31 DOCKETED TANKER SAFETY-RELATED REGULATORY INITIATIVES UNDER DEVELOPMENT. THESE REGULATORY PROJECTS COVER ALL ASPECTS OF THE COAST GUARD'S MISSIONS RELATING TO OIL TRANSPORTATION SAFETY AND ARE IN VARIOUS STAGES OF REGULATORY DEVELOPMENT. ADDED TO THESE WILL BE MANY NEW REGULATORY INITIATIVES THAT WILL BE REQUIRED TO IMPLEMENT THE OIL SPILL LEGISLATION THAT IS PRESENTLY IN CONFERENCE COMMITTEE. AS I AM SURE YOU ARE AWARE, SECRETARY SKINNER IN A LETTER TO THE CHAIRMAN OF THE CONFERENCE COMMITTEE DETAILED THE ADMINISTRATION'S POSITION ON CERTAIN PROVISIONS OF THAT LEGISLATION. I'D BE PLEASED TO PROVIDE A COPY FOR THE RECORD.

OUR EFFORTS IN IMPROVING TANKER SAFETY ARE AUGMENTED BY PARTICIPATION IN THE SHIP STRUCTURE COMMITTEE. THE SHIP STRUCTURE COMMITTEE FOSTERS A RESEARCH PROGRAM TO IMPROVE THE HULL STRUCTURES OF SHIPS AND OTHER MARINE STRUCTURES BY AN EXTENSION OF KNOWLEDGE PERTAINING TO DESIGN, MATERIALS AND METHODS OF CONSTRUCTION. THIS INTERAGENCY COMMITTEE IS COMPOSED OF THE COAST GUARD, MARITIME ADMINISTRATION, NAVAL SEA SYSTEMS COMMAND, MILITARY SEALIFT COMMAND, AND AMERICAN BUREAU OF SHIPPING. THE COMMITTEE HAS PENDING APPROXIMATELY 17 TANKER SAFETY-RELATED TECHNICAL PROJECTS. THESE PROJECTS COVER TOPICS SUCH AS FATIGUE DESIGN PROCEDURES, ELASTIC PLASTIC FRACTURE MECHANICS, AND LOAD EFFECTS ON MARINE STRUCTURES. ALL OF THESE PROJECTS ARE AIMED AT PROVIDING A BROADER KNOWLEDGE BASE FROM WHICH WE CAN ADDRESS VESSEL SAFETY.

THE COAST GUARD HAS INDEPENDENTLY INITIATED MANY STUDIES TO ENHANCE OUR OIL SPILL PREVENTION AND RESPONSE CAPABILITY. ONE SUCH STUDY WILL COMPARE AND CONTRAST THE FEASIBILITY AND TECHNICAL RISKS OF THREE APPROACHES TO MECHANICAL RECOVERY OF OIL FROM THE OCEANS: DEDICATED OIL SKIMMING VESSELS; VESSELS OF OPPORTUNITY SKIMMING SYSTEMS (VOSS) MOUNTED ON COAST GUARD VESSELS; AND DEDICATED POLLUTION RESPONSE BARGES. ANOTHER STUDY WILL DEVELOP CRITERIA TO UPGRADE AND DEVELOP NEW STRIKE TEAM EQUIPMENT. WE ARE DEVELOPING A PLAN TO COLLECT INFORMATION ON OIL SPILL RESPONSE TECHNIQUES, ENVIRONMENTAL IMPACTS, AND HUMAN HEALTH RISKS TO CREATE A DATA BASE THAT ON SCENE COORDINATORS CAN USE IN RESPONDING TO FUTURE OIL SPILLS.

WE ARE WORKING JOINTLY WITH ENVIRONMENT CANADA AND THE U.S. MINERALS MANAGEMENT SERVICE ON PROJECTS THAT INCLUDE IN-SITU BURNING, THICKNESS SENSORS, AND LASER FLUOROSENSORS. WE HAVE UNDER CONSIDERATION FUTURE R&D PROJECTS COVERING DAMAGED VESSEL COUNTERMEASURES, DEVELOPMENT OF A RESPONSE ORGANIZATION TO DEAL WITH INCIDENTS OF NATIONAL SIGNIFICANCE, OIL SPILL RECOVERY SYSTEMS, AND MULTI-AGENCY HAZARDOUS SPILL COUNTERMEASURES.

THE COAST GUARD STRONGLY SUPPORTS THE LEGISLATIVE ENHANCEMENT OF THE EXISTING FEDERAL RESPONSE MECHANISM THAT HAS BEEN SUCCESSFUL FOR MORE THAN 18 YEARS BECAUSE IT RETAINS THE ON SCENE COORDINATOR AS THE SINGLE PERSON IN CHARGE. THE ON SCENE COORDINATOR IS SUPPORTED BY A READILY IDENTIFIABLE CHAIN OF COMMAND AND IS THE IMMEDIATE FOCUS FOR COORDINATION OF ALL SPILL ACTIVITIES. WE ALSO SUPPORT THE RETENTION OF THE CLEANUP REGIME THAT HAS THE RESPONSIBLE PARTY CONDUCT THE CLEANUP IN MOST CASES WITH THE ADDED PROVISION THAT ALLOWS THE ON SCENE COORDINATOR TO DIRECT PERSONS ON-SCENE WITHOUT ACTUALLY FEDERALIZING THE CLEAN-UP.

WE HAVE COMMISSIONED A STUDY BY THE NATIONAL ACADEMY OF SCIENCES (NAS) TO INVESTIGATE THE DESIGN OF TANKERS AND OCEAN GOING TANK BARGES. THIS IS THE FIRST COMPREHENSIVE STUDY OF CONSTRUCTION FEATURES FOR PREVENTING ACCIDENTAL POLLUTION SINCE THE REQUIREMENTS OF THE 1978 PROTOCOL TO MARPOL 73 WERE IMPLEMENTED. MOST TANKERS BUILT SINCE THEN ARE REQUIRED TO HAVE PROTECTIVELY LOCATED SEGREGATED BALLAST TANKS. THEIR BALLAST TANKS ARE LOCATED TO SHIELD A PERCENTAGE OF THEIR CARGO TANKS FROM THE HULL IN CRITICAL LOCATIONS. THE NAS STUDY SHOULD

PROVIDE US WITH AN EVALUATION OF THE EFFECTIVENESS OF THIS DESIGN ARRANGEMENT. THE NAS STUDY IS DEVELOPING A LIST OF TANKER DESIGN MEASURES THAT HOLD PROMISE FOR FURTHER REDUCING POLLUTION RISKS. THE NAS STUDY WILL EVALUATE THESE MEASURES FOR EFFECTIVENESS AND IDENTIFY ANY DEFICIENCIES THAT COULD NEGATE PERCEIVED BENEFITS. THE NAS STUDY WILL MAKE USE OF NEW COMPUTER MODELING TECHNIQUES THAT PERMIT SIMULATION OF THE EFFECTS OF VARIOUS ACCIDENT SCENARIOS. THIS TECHNIQUE WILL BE INVALUABLE TO NAS IN DEVELOPING THEIR RECOMMENDATIONS. THE COAST GUARD IS LOOKING FORWARD TO THE RESULTS OF THE NAS STUDY WHICH IS EXPECTED TO BE COMPLETED IN DECEMBER 1990.

MR. CHAIRMAN, THIS CONCLUDES MY STATEMENT. I WILL BE GLAD TO ANSWER ANY QUESTIONS THAT YOU OR THE OTHER MEMBERS OF THE SUBCOMMITTEE MAY HAVE.

BIOGRAPHY

DAVID H. WHITTEN, CAPTAIN, U.S. COAST GUARD

Captain Whitten graduated from the United States Coast Guard Academy in 1962 and served on the Coast Guard Cutter MENDOTA, first as a deck officer and then as an engineering assistant. In 1965 he attended the University of Michigan where he earned a Master's Degree in Naval Architecture and Marine Engineering and Mechanical Engineering. He was then assigned to Coast Guard Headquarters in Washington, DC where he participated in the development of international safety standards for commercial shipping.

In 1971 Captain Whitten was transferred to the Coast Guard's field technical office in New Orleans to supervise the review of commercial ship construction plans for ships built on the Gulf Coast and South Atlantic Coast. He served as Engineering Officer on Coast Guard Cutter CHASE out of Boston, enforcing the drug interdiction program and fisheries conservation laws along the Atlantic Coast until 1977 when he was transferred to the Marine Inspection Office in New Orleans. In this assignment he helped develop the Coast Guard's safety inspection program of offshore drilling operations. In 1980 Captain Whitten was assigned as Chief of the New Orleans field technical office, serving until 1984. He was then selected as Commanding Officer of the Marine Safety Office in Wilmington, North Carolina. His next assignment was as Chief of the Marine Safety Division of the Seventh Coast Guard District, in Miami, Florida, until his present assignment as Deputy Chief of the Office of Marine Safety, Security and Environmental Protection.

Mr. TORRICELLI. Thank you, Captain Whitten.
Mr. Bowman?

STATEMENT OF MR. RICHARD BOWMAN, ASSOCIATE ADMINISTRATOR, MARITIME ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

Mr. BOWMAN. Mr. Chairman, thank you for the opportunity to submit our testimony for the record. Captain Leeback asked that I express to you his regrets that he could not be here with you today. As you know, his extensive travel schedule, having just returned from Russia, and a number of other commitments, he was unable to be here, but he wanted to very clearly express to you his regrets that he could not be with you today.

Mr. TORRICELLI. Thank you, Mr. Bowman.

Mr. BOWMAN. Thank you for the opportunity, Mr. Chairman. I just want to touch briefly on a number of areas that we view are important and should be considered in the context of the oil spill and oil safety concerns.

MARAD has a wide range of responsibilities, but with regards to oil safety some of the ones that we feel are most important are our ship design responsibilities, shipboard training, and of course the research areas that are handled in many areas in the Maritime Administration.

Mr. Chairman, often, and all too often, the human element in transportation is left aside and the desire to fix things with technical changes is often laid out front. Ships can be designed to perfection, state of the art navigation systems can be put into place, the legal consequences of people who don't follow the rules can be legislated, but without adequate attention to the training of the crew that operate these things, we can continue to have the problems that we have had to date.

Training is critical in this effort and the Maritime Administration has five training academies, State training academies, that provide extensive training for tanker men, licensed officers, also the Merchant Marine Academy provides training. There is a lot of focus during the course of these trainings on oil, oil spills, tank training, handling, and ship handling, all of which we believe are critical factors in the safety of transportation for the handling of oil.

The Secretary, Mr. Chairman, recently in his National Transportation Plan outlined one of the concerns that he felt was important with regards to the research. He felt that the human factors were important to focus on, both the causes of accidents, the effect of operator impairment, perceptual errors and fatigue, and the need to design equipment changes to reduce the effects on those operating various maritime pieces of equipment including in the Maritime Administration.

We believe, Mr. Chairman, that the advances that have occurred to date in simulators and the use of simulators in training should be continued to be pushed. These are very important. We have learned a lot from them. They provide excellent training aids. We believe that these are the types of aids that should continue to be

advanced and installed on the bridges of ships so that they can further aid the operators of the vessels in safe navigation.

We feel very strongly that as we move forward over the next number of years that some of these new research opportunities are just in front of us. There are some that are already starting to be in place on the bridges of ships that provide opportunities to not only look forward and around but also to look underneath to see what kind of problems, what kind of problems may be encountered by these ships, and also provide the technical wherewithal for the operators of the ships to avoid various hazards that may be coming up.

We believe that these are technical advances that are right with us. As a matter of fact, the beginning of these kind of advances are being already placed on a number of ships.

Mr. Chairman, while we believe that training and research are critical, we don't believe that they're the only answer. We believe that they should not be left aside as the move is to correct the deficiencies in the ships today. We believe that they should continue to be considered. We think that it's very important and it's consistent, one of the things that the Secretary was concerned about, to make sure that we didn't leave any areas untouched in his effort to move forward to improve the operational safety of oil vessels.

Mr. Chairman, thank you for the opportunity to provide a statement. I'll be glad to answer any questions.

[The prepared statement of Mr. Bowman follows:]

STATEMENT OF RICHARD E. BOWMAN, ASSOCIATE ADMINISTRATOR OF THE MARITIME ADMINISTRATION IN THE DEPARTMENT OF TRANSPORTATION, BEFORE THE U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS, ON OIL TRANSPORTATION SAFETY.

MAY 24, 1990

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE, IT IS MY PLEASURE TO BE WITH YOU TODAY, TO REPRESENT THE MARITIME ADMINISTRATION AT THIS SIGNIFICANT HEARING ON THE SUBJECT OF OIL TRANSPORTATION SAFETY. THE MARITIME ADMINISTRATION HAS A LONG-STANDING INTEREST IN SHIP DESIGNS THAT ENHANCE SAFETY AND PROTECT THE ENVIRONMENT AS WELL AS COMPETITIVE COMMERCIAL SHIP OPERATION. THE MARITIME ADMINISTRATION IS PARTICIPATING AS A LIAISON IN THE STUDY BEING CONDUCTED BY THE NATIONAL ACADEMY OF SCIENCES ON EVALUATING THE MOST EFFECTIVE MEANS OF IMPROVING OPERATIONAL SAFETY AND REDUCING POLLUTION RISKS OF TANKERS AND OCEAN-GOING TANK BARGES. WE SUPPORT THE COAST GUARD'S TESTIMONY WHICH DISCUSSES THESE ISSUES.

MARITIME ADMINISTRATION EFFORTS IN THIS AREA ALSO INCLUDE MARITIME LABOR TRAINING AND COOPERATIVE RESEARCH EFFORTS WITH THE SHIPPING INDUSTRY. MY STATEMENT WILL COVER THESE AREAS.

MARITIME LABOR TRAINING

SOMETIMES OVERLOOKED IN THE PUBLIC DEBATE OVER OIL TRANSPORTATION SAFETY IS THE HUMAN ELEMENT. SHIPS CAN BE DESIGNED TO PERFECTION; STATE OF THE ART NAVIGATION SYSTEMS CAN BE PUT IN PLACE; AND LEGAL CONSEQUENCES FOR UNSAFE OPERATION CAN BE LEGISLATED. BUT WITHOUT ADEQUATE ATTENTION TO THE CREW AND

SHORE SIDE PERSONNEL INVOLVED WITH OIL TRANSPORTATION, THESE EFFORTS COULD BE FOR NAUGHT.

THE FIRST ESSENTIAL STEP IS TRAINING. CURRENT TRAINING PROGRAMS IN SAFE CARRIAGE AND TRANSFER OF PETROLEUM PRODUCT CARGOES ARE PROVIDED AT FEDERAL, STATE, AND OTHER MARITIME TRAINING FACILITIES IN THE UNITED STATES. IN ADDITION TO NAVIGATION AND ENGINEERING TRAINING, LICENSED OFFICER CANDIDATES AT THE U.S. MERCHANT MARINE ACADEMY AND THE SIX STATE MARITIME ACADEMIES BECOME KNOWLEDGABLE AND PROFICIENT IN PETROLEUM PRODUCT HANDLING, OIL CARGO PROPERTIES, TANKER CARGO SYSTEMS, TANK CLEANING, BALLASTING, SAFETY PROCEDURES, SHIP STABILITY, AND OIL POLLUTION REGULATIONS. TRAINING IS PROVIDED IN THE CLASSROOM WITHOUT ANY THREAT TO THE ENVIRONMENT, USING SOPHISTICATED TANKER LOADING/DISCHARGING SIMULATORS, WHERE AVAILABLE, AND, IN ADDITION, ACTUAL HANDS-ON EXPERIENCE ON U.S.-FLAG TANK VESSELS.

UNLICENSED CREW MEMBERS OBTAIN RELEVANT TANKERMAN OR PUMPMAN OPERATIONS TRAINING AT MARITIME TRAINING SCHOOLS. FAMILIARIZATION WITH OIL CARGO HANDLING EQUIPMENT IS A MAJOR SUBJECT IN THESE PROGRAMS. AS AN EXAMPLE, THE SEAFARERS' HARRY LUNDEBERG SCHOOL OF SEAMANSHIP ALSO OFFERS A SIX-WEEK UPGRADING COURSE FOR PROSPECTIVE TANKER UNLICENSED PERSONNEL. ALL OF THE FEDERAL, STATE, AND INDUSTRY SCHOOLS PROMOTE SAFE AND EFFICIENT OIL PRODUCT HANDLING, AS WELL AS SAFE SHIP HANDLING. THESE PROGRAMS ARE VITAL TO THE PROTECTION OF THE ENVIRONMENT AND ARE BEING RE-EMPHASIZED IN LIGHT OF RECENT TANKER CASUALTIES. IN THE

FUTURE, CREWS OF U.S. FLAG OIL TANKERS WILL BE EVEN MORE HIGHLY TRAINED IN SAFETY AND POLLUTION ABATEMENT TECHNIQUES.

ADDITIONALLY, SYSTEMS ARE BEING INSTALLED ABOARD VESSELS TO ASSURE THAT SHIPS' OFFICERS WILL BE WARNED OF ANY POTENTIAL COLLISION OR GROUNDING WHICH COULD RESULT IN UNCONTROLLED DISCHARGE OF CARGO. IMPROVED SHIP NAVIGATION ACCURACIES WITH SATELLITE SYSTEMS, SUCH AS THE GLOBAL POSITIONING SYSTEM, ARE NOW POSSIBLE AND WILL SOON BE OPERATIONAL WORLDWIDE.

NEW ELECTRONIC CHART DATABASES AND DISPLAY SYSTEMS WILL PROVIDE SHIPS' OFFICERS WITH DETAILED INFORMATION ABOUT UNDERWATER HAZARDS AND WATER DEPTHS. WHEN COMBINED WITH NORMAL RADAR IMAGES, A POWERFUL NEW "EXPERT SYSTEM" TO ASSIST THE NAVIGATOR IS BEING CREATED.

THESE "EXPERT SYSTEMS" ALLOW NOT ONLY THE CHART AND RADAR INFORMATION TO BE DISPLAYED, BUT ALSO THEY ANTICIPATE POTENTIAL HAZARDS AND PROVIDE RECOMMENDED MANEUVERING ACTIONS TO AVOID TROUBLE. EXISTING CONTRACTS ARE IN PLACE TO SUPPORT THESE DEVELOPMENTS IN COOPERATION WITH INDUSTRY AND ACADEMIC INSTITUTIONS AS WELL AS THE COAST GUARD, THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND THE MARITIME ADMINISTRATION.

IN OUR VIEW, ALL THESE TECHNOLOGICAL IMPROVEMENTS IN VESSEL DESIGN AND EQUIPMENT CAN PROVIDE PART, BUT NOT ALL, OF THE ANSWER. PEOPLE WILL STILL DETERMINE THE ULTIMATE LEVEL OF SAFETY. WE MUST BE SURE OUR SEAFARERS HAVE THE HIGHEST POSSIBLE LEVEL OF SKILLS AND THE BEST POSSIBLE TOOLS. TRAINING SHOULD INCLUDE THE USE OF SIMULATORS SO THAT CANDIDATES CAN REPEAT

DIFFICULT MANEUVERS, SUCH AS ENTRY INTO PORTS, WITH NO RISK TO THE ENVIRONMENT.

RESEARCH

THE MARITIME ADMINISTRATION BELIEVES THAT TANKERS CAN BE DESIGNED TO OPERATE MORE SAFELY AND STILL BE COMPETITIVE IN THE MARKETPLACE. THE RECOGNITION OF THE IMPORTANCE OF RESEARCH AND DEVELOPMENT AND TECHNOLOGY ADVANCEMENT TO ALL TRANSPORTATION MODES IS A KEY ELEMENT OF THE SECRETARY'S NATIONAL TRANSPORTATION POLICY (NTP). ONE OF THE MOST IMPORTANT ELEMENTS OF THIS POLICY IS TO CONDUCT A COMPREHENSIVE PROGRAM OF RESEARCH ON HUMAN FACTORS IN TRANSPORTATION, INCLUDING THE CAUSES OF TRANSPORTATION ACCIDENTS AND THE EFFECTS OF OPERATOR IMPAIRMENT, PERCEPTUAL ERRORS, AND FATIGUE, AS WELL AS DESIGN AND OPERATING CHANGES THAT CAN ELIMINATE OR REDUCE THOSE EFFECTS. ONE OF THE UNDERLYING TENETS OF THE ENTIRE NTP IS THE INVOLVEMENT OF THE PRIVATE SECTOR IN THESE TYPES OF JOINT INITIATIVES.

AS A RESULT OF SUCH EFFORTS, THERE HAVE BEEN MANY INNOVATIONS, INCLUDING THE SATELITE COMMUNICATIONS FOR SHIP-TO-SHORE VOICE AND DATA COMMUNICATIONS, TO NAME JUST ONE. OTHERS HAVE BEEN MENTIONED EARLIER IN MY STATEMENT AND, BASED UPON THE RAPID ADVANCES IN TECHNOLOGY, I AM SURE MANY MORE WILL COME THAT WILL ASSIST IN PROVIDING A SAFER OPERATING WORKPLACE, AS WELL AS INCREASED ENVIRONMENTAL PROTECTION. I CANNOT OVER-EMPHASIZE, HOWEVER, THE POINT THAT I MADE AT THE BEGINNING -- ALL OF THESE TECHNOLOGICAL ADVANCES ARE INEXTRICABLY TIED TO THE PERSONNEL THAT OPERATE THEM.

MR. CHAIRMAN, THIS COMPLETES MY STATEMENT AND I WILL BE PLEASED TO ANSWER ANY QUESTIONS THAT YOU OR OTHER SUBCOMMITTEE MEMBERS MAY HAVE.

Mr. TORRICELLI. Thank you, Mr. Bowman.

Captain, as I noted in my opening statement, through the years the Coast Guard has found itself on various sides of this issue taking a variety of positions. In 1973 and 1977 the Coast Guard backed double bottoms for oil tankers, but later in 1973 and 1974 some of the same backing, the double bottom requirements specifically—in 1975, despite your own findings that it would have been effective, in your words, "in 96 percent of all groundings", the Coast Guard rejected rules that would have required them.

Could you account for this movement of positions?

Captain WHITTEN. Mr. Chairman, the Coast Guard has been looking at as many ways as possible to prevent pollution in the transport of oil in ships. We did agree that the creation of a secondary boundary would be one part of the total system. The way that some of the proposals that were being made were brought to us, there were some serious concerns about how to implement this type of design approach. For instance, retrofitting, many people would agree, has some serious drawbacks because of the technology that perhaps doesn't exist on how to do it in a safe fashion.

Mr. TORRICELLI. Do you share that view that the technology to be certain to retrofitting is done effectively on tankers is—

Captain WHITTEN. Yes, sir. I believe that we could have serious problems with retrofitting of double bottoms on existing tank ships. As an example, you could be taking steel that was of an alloy 30 years ago and placing on it an alloy steel that's present today. The decision as to which welding rod would you use to make that connection. You could have crack initiators start that might not be seen initially. These could be done both in U.S. yards and in foreign shipyards.

Mr. TORRICELLI. Is this to mean, in your mind, that this is potentially worse than doing nothing at all?

Captain WHITTEN. That is very possible. This is part of the request that we've made to the National Academy of Sciences to look into these, the benefits and the drawbacks to this type of design detail.

Mr. TORRICELLI. When the Coast Guard has previously endorsed double bottoms, this hadn't been considered, or people came to a different conclusion?

Captain WHITTEN. I can't speak to you, sir, on the full program that the Coast Guard was endorsing back in 1973. The concept of double bottoms on new construction is certainly easier to support than the retrofitting of—

Mr. TORRICELLI. Let's get right to that question, then. Any ambivalence that you have is concerning the issue of retrofitting the existing fleet. Do you harbor any hesitations with regard to new construction of oil tankers in the domestic trade?

Captain WHITTEN. The hesitation would be to take a look at what the National Academy of Science study does show us. But Secretary Skinner has transmitted a letter to the conferees supporting in general the principle of double bottoms—or double hulls rather—on new construction with the reservation that he would like to get the report from the NAS.

Mr. TORRICELLI. So your position is that you support the Administration's view as a matter of general policy of supporting double bottoms, but you would like to see the research?

Captain WHITTEN. That is correct.

Mr. TORRICELLI. Is there some reason that you believe that this finding is going to be different or yield some result that all these previous studies have not? Is there some focus that is different?

Captain WHITTEN. I don't have any knowledge of the progress of the National Academy of Science study, and not certainly what their results are going to be.

Mr. TORRICELLI. My point is that there have been so many studies by your organization and by others. Anyone would be curious as to why you found those inadequate and now await another. A skeptic would be of the view that some are simply waiting for a study that confirms their own position and until that happens no study is adequate.

Captain WHITTEN. I think concerns that need to be looked at are what happens inside a double bottom as the ship operates over the year. What you would weigh the hazards of gases accumulating in there as the inner tank might create a — have a fissure, and you would have cargo dripping in down there. We would have to send Coast Guard inspectors down into the double bottoms on an annual basis to inspect the U.S. ships. That's a hazardous job.

I hope the study will weigh the sources of benefits.

Mr. TORRICELLI. As you and I know, there are great numbers of double bottom ships today in the world's oceans including those in trade with the United States handling hazardous cargoes and chemicals, other petroleum products. For some reason that this extensive international experience and this domestic experience does not enable us to feel this reassurance—I for one am unaware of any incidents involving difficulties moment with the double bottom vessels.

Is there some reason that this practical experience with those companies who have been operating these ships is not sufficient to assuage your—

Captain WHITTEN. I don't have an answer for you.

Mr. TORRICELLI. Mr. Bowman, would you like to comment on any of these?

Mr. BOWMAN. Mr. Chairman, these are technical issues with regards to the ships and ship design. Coast Guard merits—

Mr. TORRICELLI. Do either of you disagree with assessments that, in the case of the Exxon Valdez, perhaps 60 percent less of this oil would have escaped if it had been a double hull? Is that a fair bench mark to use for these purposes?

Captain WHITTEN. I have some reservations on that, sir. I don't think it's been completely and fully studied. We don't know what would have happened had there been a double bottom as far as additional salt water rushing into the ship, would it have been harder aground, might it have broken up while it was sitting on Bligh Reef—those calculations are speculative at best.

So just to say that a double bottom would have absolutely created a lesser spill, I would be hard-pressed to make that statement.

Mr. TORRICELLI. Captain, there is so much national attention on the Valdez as an oil port, we sometimes fail to recognize the

amount of oil traffic in our second largest petroleum port, the City of New York, which is of some local interest to me—I think 91 tons of oil in extraordinary oil trade. Of course much of that oil is entered in the port of New York using the lightering process.

The conferees were now considering a double bottom requirement, are considering exempting ships engaged in this process. Therefore, much of the oil that's coming into the port of New York would not benefit from double bottoms.

Is that an appropriate exception to make, in your judgment? Is there any empirical evidence that would support that?

Captain WHITTEN. Yes, sir. I'm perhaps confused, but it was my belief that the conferees, when they talked about the delivering vessels, they're talking about the mother ship that could be up to 60 miles off shore as being exempt from a double hull requirement. But the delivery vessels, when coming into the port would be covered by the requirement for a double hull.

Mr. TORRICELLI. I understand that. Nevertheless, a massive oil tanker sitting off New York Harbor would be exempt because it is involved in this lightering process and not actually coming to appear in the Harbor. I'm asking you to take a position in advising the conferees whether you think that that's an appropriate exception recognizing that it would mean that most of the oil entering our major cities, certainly New York, I cannot speak for Boston or other locations, would be exempt. What would your advice be to the conferees on that question?

Captain WHITTEN. You're referring to the vessels that would be at least 60 miles off shore that would be exempt?

Mr. TORRICELLI. You decided it's 60 miles. I'm not so accepting of where they are, but nevertheless, the mother ship that is not actually entering the harbor.

Captain WHITTEN. Yes, sir, I think that the Administration generally supports that the mother ship also would be required to have a double hull because it's in our economic zone, our zone of interest.

Mr. TORRICELLI. So that's an important distinction to make. So you would indeed not think this exception is in our interests?

Captain WHITTEN. That is the position of the Administration, Mr. Chairman.

Mr. TORRICELLI. Mr. Bowman, do you have views on that issue?

Mr. BOWMAN. I just thought I would just add, Mr. Chairman, as a practical matter, much of the lightering that's done today is done either very close to shore or in the case in the gulf where there is essentially protected water and is done 60 miles off shore. I think in the areas and the concern that you had expressed—if you would—the North Atlantic, lightering from 60 miles out into much smaller vessels in winter and those things, I think it very unlikely that it'll occur. Much of the lightering that is talked about and at least is referred here as the kind of things that are handled — the Chesapeake Bay, the Delaware Bay—

Mr. TORRICELLI. Tell me, where is the lightering for— first, is this largely a New York issue or is this also a Baltimore or Boston, Philadelphia issue?

Mr. BOWMAN. Mr. Chairman, the lightering in those areas are done within two or three miles. They are very close in.

Mr. TORRICELLI. For all of those?

Mr. BOWMAN. Those would all have to be double hulled in that case. The lightering that's largely being talked about is the lightering that's handled in the gulf that is today being handled while the ships are moving 60 miles off shore. The Coast Guard has responsibility and oversees those lightering operations.

Mr. TORRICELLI. What port are we talking about? Are we talking about New Orleans—

Captain WHITTEN. Galveston—

Mr. TORRICELLI.—Galveston—

Captain WHITTEN. Port Arthur, New Orleans—

Mr. TORRICELLI. Those are done 60 miles off shore? But ships unloading in the port of New York, how far do they tend to be in the lightering process?

Mr. BOWMAN. Mr. Chairman, I'm not that familiar with New York, but I am with the Delaware Harbor and the Chesapeake Bay, and those are within a couple of miles. Many of them are pulled into the deep part of the bay and off loaded in part of the bay, so they would all have to be covered.

Captain WHITTEN. And I don't have specific statistics on you, but we could provide that to you, sir.

Mr. TORRICELLI. Well, then, you've stated your position, which is what was important for us to receive. It was helpful.

Mr. Walker?

Mr. WALKER. Thank you, Mr. Chairman.

When we talk about double hull construction, we're talking about a fairly technical term that means a ship constructed with two steel hulls, or is that a definition which is somewhat variable?

Captain WHITTEN. That's an excellent question, sir, because we really haven't seen a sound definition of what a double hull is. I think if you get 10 experts together you may get 10 different answers. But in principle it is two steel hulls, one that contains a cargo and then a secondary boundary some distance off.

Mr. WALKER. The reason that I ask is because this is a Committee concerned about advanced technology and I think that one of the things that we're beginning to see is a development of some new materials that may well speak to some of these issues. I would hate to see us lock ourselves in legislatively to the idea of two steel hulls has being the only direction to go.

What I'm going to ask you is, is the NAS study going to look at a variety of advanced technologies that might be available to us to both retrofit present ships and to use in the construction of new ships?

I'm thinking specifically about some technology that I've recently been made familiar with which is essentially a fabric technology. It's a very, very tough fabric that is used in a number of applications at the present time that literally could be used to line present generations of ships and I think could retrofit them in a way that would make them almost as strong as a double hull. It seems to me that would be a far more inexpensive route to go. It would assure that the present fleet of ships might be able to be used in a safer manner. I would hate to see us taking stands that would rule that out—if in fact this idea of double hull is kind of a work of art—that

as soon as we specify that we might throw out any chance to do advanced technical solutions.

Could you enlighten us a little on that?

Captain WHITTEN. Yes, sir. I can't tell you exactly what areas the Academy is studying in the ways of advanced materials and their application to double hulls or just in oil transport. We have experienced, though, in our casualty investigations of liners, as you might call them—in the event of a grounding or a collision, the jagged steel members of the ship that are penetrated inward have almost always penetrated any type of fabric or lining thus rendering them useless as a containment device. The liners are generally, in today's technology, used as a protection against the steel hull against the corrosive action of the cargo, but not as a protection against release due to a calamity.

Mr. WALKER. I mean—I'm not a scientist so I can't vouch for it—but what I'm told is that there are some advanced materials that they feel solve that problem that are being used in applications right now that are very strong and probably would have the opportunity to provide a real inner bladder that would protect against both the tear and anything that would be coming through the tear. As I say, I can't vouch for that, all I would suggest though is that we probably ought not take steps that would rule out the use of some of these kinds of technologies if in fact they could be used for retrofitting.

Captain WHITTEN. Absolutely, sir. I fully support that. We don't want to ignore any technology that's present today or on the horizon that would help solve this.

Mr. WALKER. Is the mandate for NAS broad enough that they can include advanced materials as part of what they're looking at, or are they fairly narrowly constricted to a look at only things that are kind of a present technological generations?

Captain WHITTEN. I believe it's broad enough so that they have the mandate to look into new materials and their applications in the transport of oil.

Mr. WALKER. I thank you.

Mr. TORRICELLI. If the gentleman would yield, do they both have the mandate ar[illegible] are they in fact also doing it?

Captain WHITTEN. Sir, I can't tell you what they're doing on their day to day basis. I just don't know that.

Mr. TORRICELLI. In your own program I noticed that there is a rather significant recommended overall increase in the Coast Guard's research and development funds to $28 million, figures that were only a fraction of that in previous years. You're going to have considerably more money potentially on your hands for your own research and development program. Is it your intention to look at this question that Mr. Walker has raised about other available technologies for retrofitting and the use of these fibers and fabrics?

Captain WHITTEN. That type of research and development isn't on our schedule for 1990 but we are looking at a proposal for fiscal year 1992. That budget hasn't been approved yet so I can't promise you anything in that area.

As you correctly point out, we're very pleased that we have a significant increase. Just the Marine Safety side of our research and

development budget for this fiscal year is over $2 million including $125,000 for the facility—

Mr. TORRICELLI. But you are contemplating that in fiscal year 1992, if the same levels are maintained, you would be coming forward to propose a direct Coast Guard research program in some of these other technologies?

Captain WHITTEN. Yes, sir. That would be—

Mr. TORRICELLI. Like Mr. Walker—

Mr. WALKER. Mr. Chairman, if I can just follow up on that point, if someone were to bring to you advanced materials now that they would have the potential of being able to both retrofit and be a part of new construction, do you have the facilities to be able to evaluate such materials right now or would we have to wait two or three years before you could even get around to the evaluation of materials that might well be on the market at the present time?

Captain WHITTEN. We have the mechanism in place to do that evaluation, sir. It would probably take two or three years to do a large scale evaluation.

Mr. WALKER. What I'm referring to is, we wouldn't have to wait two or three years for you to begin the evaluation and then take another two or three years? Do you have the facilities available now so that if someone brought to you materials that they claimed would have the ability to meet this requirement, you could begin research right now that would get us an answer within two or three years?

Captain WHITTEN. It would mean redirecting resources that are already obligated, to postpone that research, if this had a higher priority.

Mr. WALKER. Thank you, Mr. Chairman.

Mr. TORRICELLI. I can't speak for Mr. Walker, but that does not leave me with great confidence in our ability in the near term to undertake this kind of evaluation. Like Mr. Walker, I am not a scientist, but I know that this country manufactures airplane wings which hold fuel that when filled with bullet holes seal themselves. They manufacture artificial materials now that are stronger than steel for aircraft and other industries where, if confronted with a steel rod, would not be penetrated. Although I cannot claim to have the technical expertise from all experiences to date, I am led to believe—like I suspect Mr. Walker is—those materials exist and would survive evaluations.

But I also did not witness your exchange with Mr. Walker with any degree of confidence that with this level of funding continuing you are in the near term prepared to receive such materials or engage in such evaluations. Am I suffering from a misunderstanding?

Captain WHITTEN. I hope so, sir. We want to do everything that we can to advance the technology of the safe transport of oil.

Mr. TORRICELLI. I know that. I'm not looking for your good wishes, though I'm pleased to receive them. I'm looking for—you are about to receive a significant amount of increase in funding for research and development. You have said to me that your hope is that you would get that in a succeeding year. In a succeeding year—to get directly to Mr. Walker's question—do you then have the personnel, the infrastructure within the Coast Guard, to begin

receiving and evaluating such materials and technology? If not, please inform the Committee. I think there's a desire here to have this work done. If not, we need to know. There are questions within the research community. Work may have to go elsewhere. We may have to find an institution that can do so, or create one if we deem it necessary.

Captain WHITTEN. Sir, we're taking our guidance right now from the National Academy of Science and I would say that all of the significant proposals that have come to us since Exxon Valdez has been turned over to them for evaluation, and our research and development program will be guided by the results that we get from the National Academy.

Mr. WALKER. Well then, it sounds to me, Mr. Chairman, as though what we may want to do is to get a letter into the National Academy of Sciences telling them that one of the things that has to be a part of that study is a look at advanced materials.

My judgment on this is somewhat colored by the fact that as serving on the Conference Committee, I know that we are faced right now with some decisions with regard to what we do on double hulls and making certain that we leave the door open for some of these technologies. In my estimation, based upon what I've seen, some of these are just over the horizon. So your priorities may be set in your research program by what the conferees come up with on the Oil Spill Bill because I am convinced, based upon just some preliminary data that I've seen, that there are some potentials out there that are not far term but are near term.

Certainly the National Academy of Sciences ought to be evaluating that as a part of their study, but you may well find that you have the need to move fairly quickly on this if the conferees move in a direction to expand the definition of what double hull may be or at least what might be a potential for retrofitting even if we require double hulls in the future.

Captain WHITTEN. Yes, sir. We are prepared to respond to the legislation as it comes out. It may mean redirecting resources of things that we're doing now that we'll have to stop doing in order to take this higher priority mandate.

Mr. WALKER. Thank you, Mr. Chairman.

Mr. TORRICELLI. Mr. Campbell?

Mr. CAMPBELL. Thank you, Mr. Chairman. On this point, it strikes me that the issue is one of whether the tanker runs aground or whether it breaks from stress. If it runs a ground, double hulling is almost irreplaceable as a means of preventing it in that the structure will cave to the pressure of the obstacle it runs aground upon. If, however, it's a question of strain, then I think materials could be improved which might perhaps lead to the elimination of the risk of the diminution of the risk. So whereas I certainly agree with the Chairman and with my Vice Chairman that this is worthy of study, I would not jump to the other conclusion that double hulling can be made unnecessary by advances in materials. If I am right, we are dealing here with running aground. There may be no substitute for a double hull.

Now this is a social scientist's view, so let me ask these specialists whether there's anything to this. Particularly I focus my question on your knowledge of oil tanker accidents, such as Valdez and

Huntington Beach, recently, whether we are speaking in general of running aground that leads to spills, or strain in the hull structure itself.

Captain WHITTEN. I believe, sir, that you're talking— when you mention strain—that we're talking about tearing or ripping apart, breaking up of a vessel versus—

Mr. CAMPBELL. Running aground.

Captain WHITTEN.—where it runs aground and strikes a submerged object.

Mr. CAMPBELL. That's correct. That's the distinction I am interested in.

Captain WHITTEN. The groundings that we have looked at that we have records of, in 85 percent of them, single hull vessels, there was no release of oil. It was only in 15 percent of the groundings that there was a release.

Mr. CAMPBELL. Could you tell—

Captain WHITTEN. But a double bottom might have prevented release in most of those. I personally did the investigation on the accident of the World Prodigy in Newport last summer. I have pictures of the damage that was done when it hit a rock entering Newport Harbor. It's possible that a double bottom could have prevented the oil, but it's not certain. It looks like the penetration was up past 40 inches. We sometimes talk of double bottoms of being two meters which might have prevented a spill in that case.

A concern that the captain of the port has when a vessel runs aground, even if there is no immediate outflow of oil, is that if it stays aground, it's in an unnatural condition and it could start breaking up. We had just recently a ship run aground off the Florida Keys. There was no oil spilled, but when you stood on the deck, you could feel it popping. It was of utmost urgency to get that vessel off the reef and into it's natural environment for the concern was that it could break up and we would have a massive spill, not because of a lack of a double bottom or a double hull, but the fact that it was being supported unnaturally.

So breaking up is a major catastrophe that often happens — I shouldn't say often happens—it can happen because of a ground. It can also happen because of a defect in the structure a crack initiates and it's just enough in the seaway.

Mr. CAMPBELL. This is the question that I was asking. Do you have any information as to how many spills are caused by the latter and how many by the former? How many by strain, breaking up of a hull, and how many by running aground or hitting a submerged object?

Captain WHITTEN. I don't have that data with me, sir, but we can provide that to you.

[The material to be provided follows:]

Since 1981, there have been 3 major oil spills (over 100,000 gallons) caused by structural failure that were not the result of a collision, explosion, grounding, or other external force on a tank vessel. Eighteen major spills were the result of groundings, explosions, or collisions.

Mr. CAMPBELL. Well, I think—I'd appreciate that of course—but I think that would be a relevant criterion in deciding what the technological response ought to be.

Mr. TORRICELLI. Mr. Campbell, if you'd yield—

Mr. CAMPBELL. I'd be pleased to, Mr. Chairman.

Mr. TORRICELLI.—though these may not be the exact numbers, it is my impression that the overwhelming majority of these instances involve groundings and collisions and not from strain. Is my impression correct, Mr. Bowman or Captain Whitten?

Captain WHITTEN. By far the sheer numbers of pollution incidents are by groundings. I would like to reserve comment on whether the volume of oil that's entered the ocean has been more from ships breaking up because some of the ships that broke up were as a result of grounding. I'm not sure how we would differentiate the two.

Mr. TORRICELLI. Nevertheless, my impression is correct?

Captain WHITTEN. Yes, sir.

Mr. CAMPBELL. I thank the Chairman for that point, and I just recur to the issue of whether any material can withstand the force of hitting a submerged object or a grounding. The analogy is imperfect but let me make it, it's to sailing through a mine field. In World War II the protection was by a perimeter, a skirt, which we knew would blow up, but at least it wasn't the ship that blew up. So by analogy, a skirt notion might be the only way. I'd just be hesitant to take my colleague's instruction as suggesting the Committee's judgment on this issue, because obviously we'd like to find out a lot more before. It may be at least my bias, if I have one, that double hulling is more likely to be the necessity than tougher materials.

But again, this is by way of comment from someone who must be considered very ill-informed.

I have only one other question and that is—perhaps you could speak to this, perhaps not, so if you can't, just tell me and it's perfectly all right. A very big question to those of us who represent the Coast, as the Chairman and I both do though they happen to be different coasts, is the comparative danger of a tanker and an oil platform—that is to say instances of a pipeline for an oil drilling platform breaking up or being hit by merchant traffic leading to a spill in that fashion. This is a very important debate on whether we should drill off shore as opposed to import more in tankers.

The question I lead to is, do you have any information to share with us today on the numbers of instances of oil rig platforms being hit by traffic or otherwise leading to a spill — that as compared with an oil tanker?

Captain WHITTEN. No, sir, I don't have the statistics that you request, but if that information is available in our files, I'd be pleased to provide it to you.

[The material to be provided follows:]

Our pollution records indicate that since 1980, there have been 15 cases where an oil platform has been struck by a vessel that has resulted in a discharge of oil. The largest spill of this nature was 3,000 gallons, and the incident occurred in 1980.

Captain WHITTEN. If I could go on?

Mr. CAMPBELL. Sure.

Captain WHITTEN. I don't think it's a frequent occurrence.

Mr. CAMPBELL. No, I don't think so either.

Captain WHITTEN. The many years I have served in the Gulf of Mexico, where there are a lot of platforms, it was a concern, but

the prudent navigator knew the location of the platforms, they're adequately marked on the charts, and they're well-lighted.

Mr. CAMPBELL. We do, however, have instances such as Santa Barbara where there is a spill not caused by a collision but by a technological flaw in the oil drilling platform.

I suppose the last question I have—I said this was the last so pardon me, it is now the last—is whether the scope of the study being done would encompass any technological improvements on oil platforms and what could be done to make that hazard less.

Captain WHITTEN. No, sir, I believe their mandate was just for tank ships.

Mr. CAMPBELL. On that connection, I would suggest to the Chairman that perhaps the study at some point, perhaps not our Committee, but needs to be expanded. That's really the tradeoff in which we are engaged.

I thank the Chairman. I thank the panel.

Mr. TORRICELLI. Thank you, Mr. Campbell.

Mr. Bowman, how would you generally compare the state of technology in the American tanker fleet today in matters of safety in oil transportation compared with international fleets? Is there a similar standard or technologies of procedure, operation, and design at the leading pace?

Mr. BOWMAN. Mr. Chairman, I would like to answer that, but I think that falls into the Coast Guard's purview, and in particular their relationships with the IMO and the other international organizations.

Mr. TORRICELLI. I'd be happy to direct it to Captain Whitten. With all respect, did Captain Whitten say that the American fleet was being maintained at the highest level of world safety? I would be one extraordinarily surprised member of this Committee—

[Laughter.]

Mr. TORRICELLI.—but I'll take your invitation.

Captain Whitten?

Captain WHITTEN. I'd have to agree with the Chairman.

[Laughter.]

Mr. TORRICELLI. Finally, if I could, Captain, there is correspondence, U.S. Coast Guard correspondence I've seen here from Commander in Prince William Sound, Mr. Thompson, citing that on a variety of occasions tankers have left Valdez Harbor with cracks in their hulls, specifically the Mobile Arctic in November of 1989 "had a two foot crack in her number two starboard ballast tank". During the correspondence, he continues to cite that this has happened in a variety of previous occasions, but in his judgment, can no longer be justified. Have we indeed through the years—not simply in Valdez but in American ports generally—allowed ships to knowingly leave harbors with cracks in their hulls and, as he cites here, do you concur that it can longer be justified and is no longer the practice?

Captain WHITTEN. The approach the Coast Guard takes with its U.S. fleet—that's where we have the most control — is that if there is a defect in the ship, we will allow a temporary repair to be made, a safe temporary repair, until a permanent repair could be made. Oftentimes a permanent repair means dry docking the ship to get the welding done, or at least gas freeing the tanks that are

involved. If the tank has a cargo in it, if the officer in charge of Marine Safety inspection feels that voyage can be made safely with this temporary repair, he will authorize that.

So the answer to your question is, yes, sir, there are vessels that leave with defects that have a temporary repair that is made.

Mr. TORRICELLI. But nevertheless, a ship leaving— random example—the Port of New York, that has a hole in its hull, although at the moment it is not transporting oil cargo would have water entering and leaving the ship therefore having some pollution impact, would be allowed to leave the port?

Captain WHITTEN. No, sir, I don't believe that's the case.

Mr. TORRICELLI. Though that clearly has been the case in the past from American ports? Is that practice no longer permitted?

Captain WHITTEN. Part of the decision that has to be made is the availability of adequate repair facilities. In the port of New York there are adequate repair facilities for a major tank ship. In the port of Valdez, that is not the case.

Mr. TORRICELLI. So can you assure us that today, under current Coast Guard procedures, from Long Beach or Baltimore or Boston, New York, Philadelphia, New Orleans, Galveston, no tanker of any flag will be allowed to leave that port with any ability of water to enter that hull, a hull of any size, even if it was not containing oil as a pollution concern? Would that not be permitted?

Captain WHITTEN. Sir, there are too many variations or speculations on what you've just asked me.

Mr. TORRICELLI. Well, there's one common denominator.

Captain WHITTEN. We would not permit a vessel to leave that was unseaworthy or where there was a threat of pollution to the environment.

Mr. TORRICELLI. I know you wouldn't permit a ship to leave that was unseaworthy. Seaworthiness is not my concern. My concern is not even a major oil spill. My concern is that a ship that has transported oil, and has seawater entering and leaving its hull, is going to leave oil on a beach or in a harbor simply in the washing motion of water in and out of the hull. Therefore, while it may be seaworthy, it may be safe, it is not in the interests of our harbors.

Now in reading this correspondence, at least from the commander in Valdez, he seems to think that this practice can no longer be justified, must cease. What I am seeking to know is whether that is general Coast Guard practice at the moment.

Captain WHITTEN. I'm not totally familiar with his letter and what the practice has been in Valdez. If it's a class one failure—and we've recently redefined what a class one failure is to include any fracture in the hull—a repair is required.

Mr. TORRICELLI. Any fracture of any size—then before a ship is leaving New York Harbor, any fracture is going to repaired in an American yard before it leaves that harbor?

Captain WHITTEN. For U.S. vessels, we have that control, yes, sir. On a foreign vessel, it belongs to the sovereign State of its flag country. It would normally be a classification society control that would make the decision on the type of repair. It would have to be satisfactory to the Coast Guard to ensure that it gets beyond—that it safely gets beyond our jurisdiction.

Mr. TORRICELLI. But you're talking about safety. I understand safety.

Captain WHITTEN. That includes the protection of the environment.

Mr. TORRICELLI. But we certainly have the right as a sovereign power to stop a ship that is having seawater washing its oil laden hull, no matter how small the gap in the hull, from leaving our ports without repair.

Captain WHITTEN. Yes, sir. If the vessel is not in compliance with our Safety Life at Sea Convention, we have the obligation and the authority to stop that vessel.

Mr. TORRICELLI. Now let's—to end this series— therefore, no ship is leaving New York Harbor with any hole in its hull?

My confidence is sinking.

[Laughter.]

Captain WHITTEN. Sir, you're leading me down the garden path with that question, sir, because—

Mr. TORRICELLI. I'm not trying to lead you to misstate anything.

Captain WHITTEN. There are holes in hulls that are designed to be there.

Mr. TORRICELLI. Not designed to have oil left in the water, they're not.

Captain WHITTEN. No, sir. If a ship is leaking oil, or has the probability that the oil will come out of that ship, we won't let it sail from the port of New York if we know about it, and we do our best to know about it.

Mr. TORRICELLI. Like Mr. Campbell, I promised that was my final question—I lied.

[Laughter.]

Mr. CAMPBELL. I only prevaricated, Mr. Chairman.

[Laughter.]

Mr. TORRICELLI. On the question of the—for either Mr. Bowman or Captain Whitten—on the question of phasing in of double bottoms, the ship operators are arguing that an immediate phase in would force the early retirement of old and unsafe ships, raise their freight rates immediately for all shippers because of the cost of double hulls, and give incentives to bankers and others to loan money for double hull construction. Some of these may be reluctant to do this while cheap older single hull vessels are competing.

Would you comment on this? This is the financing of retroactivity, how we change the economics.

Mr. BOWMAN. Mr. Chairman, we looked at that at great length. We looked at the arguments that people were having their ships phased out before their useful life was over. We looked at the arguments that the building of double hulled vessels was going to be so expensive that they were going to drive the rate so high that the cost of oil—it may even encourage bringing in more foreign oil and not using all the oil available domestically. We looked at that whole array. We also looked at the capability of the existing shipyards in the U.S. to build ships. We took a look at the phase down of the military buildings in the shipyards so that we took a look, as that declined, what the increase in capability was in U.S. shipyards to build tankers 60,000 tons and above. In addition, we looked at the decline and the changing trend in the mix with regards to the

production of domestic oil and the decline in the domestic oil and the increase in the importing of the foreign oil.

One of the major concerns at looking at all of those issues and trying to put it together was that we wanted to make sure that we didn't take equity away from owners of ships inside what is considered their economic life. For the Maritime Administration, we view the economic life for a tanker to be 20 years.

In looking at all of those, Mr. Chairman, when the Secretary sent his proposal forward, he weighed all of those. In weighing all of them, he viewed that in fact the age of tankers would, beyond his proposal of 25 years, at the year 2000 provide an adequate time for people to adjust. It did not take away useful life or economic life for people who had invested in ships. It provided the U.S. shipyards an opportunity to phase in and build that which was necessary for the domestic trades, and recognized the decline in the oil production in the U.S.

It also recognized what was going to need to be done in foreign yards, to have ships also meet that, and we viewed that we covered those areas and that the proposal, as provided for by the Secretary in his letter to Chairman Jones, adequately covered those areas.

At the same time, it did not allow the continued aging of old tankers to be supplying to U.S. trades with the opportunities just because of older ships the normal kind of things the Coast Guard sees. You are addressing cracks, well changes, all the rest of those kinds of things.

Mr. TORRICELLI. That's very helpful, Mr. Bowman. So both in the economics of the operators and a question of adjusting the supply of oil, the incentives to retirement of old ships and the capacity of American shipyards, you feel reassured on each and every one of those questions?

Mr. BOWMAN. Yes, sir.

Mr. TORRICELLI. That's very helpful.

Mr. Campbell, do you have any further questions?

Mr. CAMPBELL. No, Mr. Chairman.

Mr. TORRICELLI. Thank you all for your participation. It's been very helpful. I appreciate your cooperation and for being so forthright with us to our questions.

For our second panel, if we could, representatives from the industry, Robert Walker, Vice President for Supply and Transportation, Conoco; Edwin Roland, President, Amoco Transport Company, and Chairman of the American Petroleum Institute Marine Transport Committee.

Mr. Roland and Mr. Walker, thank you for joining us today. I appreciate your cooperation and your interest. As you know, we welcome your prepared comments and would hope that you could provide us with some oral summary of what you've prepared for today. In either order—I'd like to see Conoco and Amoco compete to be first. Whoever would like to speak.

STATEMENT OF MR. ROBERT WALKER, VICE PRESIDENT, SUPPLY AND TRANSPORTATION, CONOCO, INC.; ACCOMPANIED BY: CAPTAIN ANTONIO VALDES, MANAGER, MARINE OPERATIONS

Mr. WALKER. We were prepared to go first, based on the agenda, so I'll do that.

First I'd like to introduce with me today is Captain Antonio Valdes. He is our manager of Marine Operations. He is a licensed Ship's Master and is expert on the operation of oil tankers. I would like to emphasize that my comments and answers to your questions represent only Conoco, and in no way speak for the petroleum industry in general.

Conoco's recent decision to move toward a double hulled tanker fleet, by the ordering of two double hulled ships, has received a lot of attention. I would like to say, first of all, that that decision is simply a part of a larger agenda which includes nine steps that we have announced aimed at protecting the environment. We have submitted those for the record.

I would like then to summarize how we made that decision to go to double hulls and the fact that we have stated that any future ships that we build will be double hulled.

This was based on primarily two reasons. Number one, it is based on the assessment of the advantages of the double hulls as they apply to Conoco's operations. It is our estimation that a vast majority of all the tanker accidents, perhaps as high as 80 percent to 90 percent involve collision or what might be called soft groundings. In those cases we feel that double hulls—I mean both double sides and double bottoms—would certainly offer a greater margin of safety.

In other words, we feel that double hulls would reduce the risk of most common kinds of tanker accidents.

Now, I want to also offer a different kind of a reason for the decision. In making our announcement of environmental initiatives, we said that we at Conoco are in business by the public's consent. There is public concern about tanker safety. We feel that that concern is legitimate and it has to be considered. So perhaps our decision was made without all of the data that might become available on the subject, but nevertheless, there comes a time to decide. In Conoco's estimation, that time has arrived and our decision has been made. As our CEO said, "So be it."

Our focus is not on cleaning up or even minimizing oil spills. Our double hulled decision is a backup. Our focus is on preventing oil spills and on the avoidance of situations that cause spills.

Certainly we need better ships to do that, but we also need better operators, better trained crews, and we need broadened Government efforts to monitor and regulate tanker traffic in the gulf. As imports increase, the traffic is going to get heavier and heavier. We have called upon the Government to enhance the role of the Coast Guard in carrying out spot inspections of vessel integrity, of lightering operations, and of safety equipment. Again, the objective is to keep the spills from happening in the first place.

So that's a quick sum;mary of our testimony. We'll be glad to answer any questions when you get to us.

Thank you.

[The prepared statement of Mr. Walker follows:]

TESTIMONY OF BOB WALKER
Vice President, Supply and Transportation
Conoco

Before the House Subcommittee on Transportation,
Aviation and Materials
Of the Committee on Science, Space And Technology

Given at Washington, D.C.
May 24, 1990

MISTER CHAIRMAN, MEMBERS OF THE SUBCOMMITTEE, LADIES AND GENTLEMEN. MY NAME IS BOB WALKER, AND I AM CONOCO'S VICE PRESIDENT FOR SUPPLY AND TRANSPORTATION. CONOCO'S TANKER FLEET FALLS WITHIN MY RESPONSIBILITIES. WITH ME IS CAPTAIN ANTONIO VALDES, OUR MANAGER FOR MARINE OPERATIONS. CAPTAIN VALDES IS A LICENSED SHIP'S MASTER AND IS EXPERT ON THE OPERATION OF OIL TANKERS AND SUPERTANKERS. I WOULD LIKE TO EMPHASIZE THAT MY COMMENTS AND ANSWERS TO YOUR QUESTIONS REPRESENT ONLY CONOCO, AND THAT I IN NO WAY SPEAK FOR THE PETROLEUM INDUSTRY IN GENERAL.

CONOCO'S DECISION TO MOVE TOWARD A DOUBLE-HULLED TANKER FLEET HAS RECEIVED A LOT OF ATTENTION. I APPRECIATE THE OPPORTUNITY TO PUT THAT DECISION INTO PROPER CONTEXT. FIRST OF ALL, THE TANKER DECISION IS PART OF A LARGER AGENDA. IT IS ONE OF NINE STEPS WE HAVE ANNOUNCED, ALL AIMED AT DOING WHAT WE CAN TO PROTECT THE ENVIRONMENT. OUR SUBMISSIONS FOR THE RECORD OF THIS HEARING INCLUDE A SUMMARIZATION OF OUR ENTIRE PROGRAM OF ENVIRONMENTAL INITIATIVES, AS WELL AS DRAWINGS THAT ILLUSTRATE THE DOUBLE-HULL CONCEPT.

THE TWO DOUBLE-HULLED TANKERS WE ARE IN THE PROCESS OF CONSTRUCTING ARE NOT OF THE SUPERTANKER CLASS. THEY ARE SMALLER VESSELS, CAPABLE OF REACHING PORTS WHERE CONOCO DOES BUSINESS. AS SUCH, MOST OF THEIR WORK PROBABLY WILL BE DONE IN THE GULF OF MEXICO, AND AT PORTS THAT SERVE GULF TRAFFIC. THESE VESSELS ALSO CAN BE USED TO UNLOAD CRUDE OIL AT SEA FROM THE SUPERTANKERS WHOSE SIZE PREVENTS THEIR CALLING ON MANY PORTS. THEN, THESE SMALLER TANKERS CAN DELIVER THAT CRUDE OIL TO TERMINALS SUCH AS ONE WE OPERATE ON THE CALCASIEU RIVER IN LOUISIANA.

OUR DECISION TO MANDATE DOUBLE HULLS ON ALL NEW TANKERS WE BUILD WAS BASED ON AN ASSESSMENT OF THE ADVANTAGES OF DOUBLE HULLS AS THEY APPLY TO CONOCO'S OPERATIONS. IN OUR ESTIMATION, THE GREAT MAJORITY OF TANKER ACCIDENTS -- PERHAPS IN THE 80 TO 90 PERCENT RANGE -- INVOLVE COLLISIONS OR WHAT MIGHT BE CALLED SOFT GROUNDINGS. IN THOSE CASES, CONOCO FEELS THAT DOUBLE HULLS -- AND I MEAN DOUBLE SIDES AND DOUBLE BOTTOMS -- WOULD CERTAINLY OFFER A GREATER MARGIN OF SAFETY. IN OTHER WORDS, WE FEEL THAT DOUBLE HULLS WOULD REDUCE RISK IN THE MOST COMMON KINDS OF TANKER ACCIDENTS. WE ANTICIPATE THAT THIS GREATER MARGIN OF SAFETY ALSO WILL APPLY TO THE OPERATIONS OF OTHER DOUBLE-HULLED VESSELS AS THEY JOIN OUR FLEET, EVEN THOUGH THESE MAY OPERATE IN DIFFERENT CIRCUMSTANCES. WE EXPECT THAT THE CURRENT DOUBLE-HULL STUDY UNDER WAY BY THE NATIONAL ACADEMY OF SCIENCE WILL OFFER NO COMPELLING REASON FOR US TO CHANGE OUR MINDS.

I ALSO WANT TO OFFER YOU A DIFFERENT KIND OF REASON FOR OUR DECISION. IN MAKING OUR ANNOUNCEMENT OF ENVIRONMENTAL INITIATIVES, WE SAID THAT WE ARE IN BUSINESS BY THE PUBLIC'S CONSENT. THERE IS PUBLIC CONCERN ABOUT TANKER SAFETY, AND WE FEEL THAT CONCERN IS LEGITIMATE AND MUST BE CONSIDERED. PERHAPS OUR DECISION WAS MADE WITHOUT ALL THE DATA THAT MIGHT BECOME AVAILABLE ON THE SUBJECT. NONETHELESS, THERE COMES A TIME TO DECIDE, AND IN CONOCO'S ESTIMATION, THAT TIME HAS ARRIVED AND OUR DECISION HAS BEEN MADE. AS OUR C-E-O SAID, SO BE IT.

TO SUMMARIZE OUR POSITION, CONOCO HAS MADE A REASONED DECISION TO ORDER DOUBLE HULLS ON ALL NEW TANKERS THAT WE BUILD. AS A MATTER OF RESPONSIBILITY, WE WOULD REVIEW THAT DECISION IF GOOD SCIENCE DICTATES SUCH A REVIEW, BUT WE DO NOT ANTICIPATE THAT HAPPENING.

WHILE I FULLY UNDERSTAND THE SUBCOMMITTEE'S INTEREST IN THE SPECIFIC SUBJECT OF DOUBLE HULLS, I MUST FINALLY MAKE WHAT CONOCO CONSIDERS TO BE A LARGER POINT. OUR DECISION ON DOUBLE HULLS IS A BACKUP. OUR FOCUS IS NOT ON CLEANING UP OR EVEN MINIMIZING OIL SPILLS. IT IS ON <u>PREVENTING</u> OIL SPILLS ... AND ON THE AVOIDANCE OF SITUATIONS THAT CAUSE SPILLS.

IT IS CERTAIN THAT MORE TANKERS WILL BE WORKING IN U.S. WATERS AS OUR DEPENDENCE ON IMPORTED CRUDE OIL GROWS. MORE TRAFFIC MEANS MORE POTENTIAL FOR ACCIDENTS. WE NEED BETTER SHIPS, YES. BUT WE ALSO NEED BETTER OPERATORS AND BETTER-TRAINED CREWS. WE NEED BROADENED GOVERNMENTAL EFFORTS TO MONITOR AND REGULATE TANKER

MOVEMENTS. WE HAVE CALLED ON THE GOVERNMENT TO ENHANCE THE ROLE OF THE COAST GUARD IN CARRYING OUT SPOT INSPECTIONS OF VESSEL INTEGRITY, LIGHTERING OPERATIONS AND SAFETY EQUIPMENT. THE OBJECTIVE IS TO KEEP SPILLS FROM HAPPENING IN THE FIRST PLACE.

IN THE END, CONOCO'S DECISION ON DOUBLE HULLS SUITS OUR PARTICULAR COMPANY'S CIRCUMSTANCES, AND IT IS A STEP WE ARE COMMITTED TO TAKE. WHETHER OR NOT SUCH A STEP IS SUITABLE FOR OTHERS, WE CANNOT SAY. WE CAN CERTAINLY TALK WITH YOU ABOUT WHY WE MADE OUR DECISION, AND WE ARE HAPPY TO DO SO TODAY.

THANK YOU.

# # #

Mr. TORRICELLI. Thank you.
Mr. Roland?

STATEMENT OF MR. EDWIN ROLAND, PRESIDENT, AMOCO TRANSPORT COMPANY, AND CHAIRMAN, AMERICAN PETROLEUM INSTITUTE MARINE TRANSPORT COMMITTEE

Mr. ROLAND. Mr. Chairman, my name is Ed Roland. I am the President of Amoco Transport Company and the Chairman of the American Petroleum Institute's Marine Transportation Committee. We very much appreciate the opportunity to appear here today.

The recent series of tanker spills has forced us to rethink our approach to operations and to renew our commitment to safe and environmentally responsible operations.

We began this review with the API Task Force on Oil Spills Report which was issued in June of 1989. That report was the work product of senior executives from Amoco, Arco, BP America, Chevron, Exxon, Mobil, Shell, and Texaco. The report delineated plans for increased effort in the areas of prevention, response, and research.

Implementation of these recommendations is at various stages of completion. I would like to quickly update you on these matters, recognizing that many await the final outcome of the legislation.

First, we believe that there should be mandatory participation for all vessels in advisory vessel traffic systems. Port entry and departure is the most hazardous part of a voyage, and well operated, VTS systems will help to significantly reduce the risk. We vigorously support provisions in the oil spill legislation which confront this issue.

With respect to pilotage, by law all vessels entering and leaving U.S. ports are required to have licensed pilots controlling the vessel. During this critical period, licensing standards and administrative procedures for pilots vary widely depending on the State and the country. NTSB, the National Transportation Safety Board, has recommended that the U.S. Coast Guard administer all pilots so as to assure that the necessary standards are met. We agree with this approach, but believe that it may be more practical to achieve this goal of higher uniform standards for pilots through a voluntary program.

The American Pilots Association is considering this approach and we suggest that Congress might help that process by expressing support for that idea.

It is very surprising to me that the Senate has not ratified the IMO Treaty on Standards for Training and Watchkeeping, STCW, which is an international standard generally applicable on a worldwide basis. Since the U.S. is not signatory, the U.S. Coast Guard is handicapped in enforcing standards on foreign flag vessels. The Treaty directly applies to issues relating to the level of training of persons handling oil cargoes.

In my business, we recognize that events have made clear the need for higher levels of training, particularly relating to bridge management. To this end, we have established a Task Force on Marine Training which is focusing on bridge management. The

Task Force is presently developing industry guidelines which will be available next year.

Oil company fleet managements and the industry in general have clarified their policies to prevent substance abuse and encourage treatment. We support expansion of the industry and Coast Guard mandatory drug and alcohol testing and enforcement of random testing. At present, random testing has been enjoined by the Federal Courts.

The industry has assigned top priority to changes in design of tankers and barges that might improve their resistance to pollution. Upon request, we've provided input to the National Academy of Science study on tank vessel design. The study, which will cover a variety of issues, is due out later this year. We are also sponsoring a forum on alternative design on June 5th of this year in Washington, D.C. This open door forum is an opportunity for different approaches to surface and to get consideration by the National Academy Committee and by the industry. Of course you and your staffs are welcome to attend.

One of the ideas which is scheduled for presentation at that forum was developed by Mitsubishi Heavy Industries of Japan. I believe that this idea has considerable merit and I personally endorse it for serious consideration by the NAS Committee. This idea is superior to the double hull design in all aspects. I am concerned that oil spill legislation will demand double hulls, thereby foreclosing this design or others which might be better. I request that you assure that language not foreclosing such alternative designs be included in the Oil Spill Bill.

Another significant issue with great potential benefit is traffic separation and routing. In areas where substantial hazards exist, traffic should be rerouted so as to minimize the danger. Industry recently agreed to route traffic well clear from the Florida Keys and Santa Barbara Island resulting in less risk in transporting oil.

Returning to the research area, we believe that the Congress can take a major step forward in helping prevent future tanker oil spills by using some of the $28 million earmarked in Title VII of H.R. 1465 to fund research and development which specifically addresses operational safety, tanker construction, and methods to contain and control tanker oil spills. As a starting point, several concepts to be presented at the June 5th forum could be worthwhile pursuing as Government financed research projects. By the end of June we should be in a position to recommend some of those projects if the Committee so desires.

Finally, I would like to stress the need for increased funding fo research and development in the area of operational safety. While the industry is pursuing improved personnel training and vessel design, the Government should vigorously address the need for improvements in vessel traffic systems, pilotage, navigational aids, facility design, and waterways management which play major roles in tanker safety.

Research in these areas can best be accomplished by the Federal Government and can help prevent oil spills from happening.

This concludes my statement.

[The prepared statement of Mr. Roland follows:]

Testimony of

Edwin Roland
President, Amoco Transport Company

on Behalf of the
American Petroleum Institute

Before the Subcommittee on
Transportation, Aviation and Materials, of the
Committee on Science, Space, and Technology
U.S. House of Representatives

May 24, 1990
Washington, D.C.

My name is Edwin Roland, President of Amoco Transport Company, and Chairman of the American Petroleum Institute's (API) Marine Transportation Committee. API is a trade association of over 200 companies involved in all aspects of the oil and natural gas industry, including exploration, production, transportation, refining and marketing. The API Marine Transportation Committee is composed of the presidents and managers of some of the largest marine operations in the United States. As a manager and a naval architect, I welcome this opportunity to present to you the industry's views on tank vessel technology, and oil spill prevention, as well as possible avenues for future research and development.

Tank Vessel Technology

Tank vessel design is a continually evolving area of engineering that is influenced by safety, economics, and improved technology. The vessels of today bear little resemblance to their predecessors of 15 years ago. Tank vessel design is strictly regulated by the International Maritime Organization (IMO), the United States Coast Guard, and the various vessel classification societies.

Current American and international tanker standards are derived from the 1978 International Conference on Tanker Safety and Pollution Prevention (TSPP). Under the auspices of the IMO, the conference was held to completely revise vessel standards to minimize the potential for vessel damage and to reduce accidental and operational oil pollution. This resulted in requirements for clean ballast, protectively located segregated ballast tanks (PLSBT), regulated ballast discharges, and reduced cargo tank sizes.

The issue of mandating double bottoms was considered by the conference and was rejected because no contemporary research or data clearly established that double bottoms would provide a greater pollution prevention benefit than protectively located segregated ballast tanks. In fact, under certain circumstances, double bottoms could exacerbate oil pollution from an incident. The international conventions resulting from the TSPP conference, therefore, made double bottoms one of several options available to shipowners to lessen the pollution risk from their vessels.

The concepts developed at the TSPP conference are presently in force internationally. TSPP has been viewed by both the international community and the industry as a significant step toward reducing the possibility of discharging oil into the sea. We believe the numbers bear this out since the average number of tanker spills greater than 5,000 barrels, recorded by the International Oil Tanker Pollution Federation, has fallen from an average annual rate of approximately 23 in the 1970s to 8 in the 1980s. Also the average oil outflow in tanker spill incidents has been reduced by more than half, and other discharges have been reduced by mandatory limits on operational discharges.

The recent series of tanker oil spills has caused the industry to renew its commitment to safe and environmentally responsible operations and to reevaluate procedures and vessel designs in order to further reduce the potential for oil spills.

API Task Force on Oil Spills

The API Task Force Report on Oil Spills, dated June 14, 1989, demonstrates our commitment. That report, the work product of

the chief executive officers and presidents of Amoco, Arco, BP America, Chevron, Exxon, Mobil, Shell, and Texaco, outlined the industry's intent in the areas of prevention of spills, response to spills, and spill-related research. The task force's recommendations are in many ways consistent with the direction being taken by Congress in the pending oil spill legislation. A copy of the task force's report is included for the record.

The implementation of the task force's recommendations is at various stages of completion, and unfortunately much is being held in abeyance until the pending legislation is enacted. This is especially true in the areas of response and research where major legislative provisions affect the scope and thrust of the industry's voluntary efforts. I will therefore concentrate my remarks on the status of the task force's prevention recommendations, as well as additional efforts taken by the industry in this area.

With respect to prevention, the task force recommended several changes that will make tanker operations more environmentally safe. Key recommendations included the following:

Vessel Traffic Systems

Recommendation: Port areas present the greatest potential threats to marine safety, especially where traffic density is high or unique navigational hazards exist. The industry therefore believes that there should be mandatory participation by all vessels in U.S. Coast Guard advisory vessel traffic systems to minimize the potential for accidents. Also, expansion of federal vessel traffic systems into port and harbor areas not presently covered is justified.

Status: Since this issue must be addressed through federal legislation, the industry is supporting the provisions on vessel traffic systems in the pending legislation.

Pilotage

Recommendation: Marine pilots play a critical role in ensuring that vessels entering a port have on board a person who is extremely knowledgeable of local conditions and traffic. However, since states regulate pilots and have their own individual standards, present standards are often inconsistent or minimal. Federal legislation should be enacted to establish higher qualifications and improved administrative standards for all state pilots in U.S. waters.

Status: The industry considers it imperative that qualifications and administrative standards for all state pilots be standardized at a uniformly high level. While we support legislation to promote this goal, we have also begun discussions with the American Pilots Association to determine if this goal can be accomplished on a voluntary basis.

Tug Assistance

Recommendation: Where extraordinary navigational hazards are deemed to exist by the U.S. Coast Guard, vessels should be required to have: (I) tug assistance, or (II) twin screws, or (III) bow thrusters or (IV) other suitable equipment enabling enhanced independent maneuvering.

Status: Companies operating out of Valdez, Alaska, have already implemented a program of tug assistance in the wake of the Alaskan oil spill, and the industry is actively supporting provisions in the pending oil spill legislation to require the Coast Guard to study if and where this type of requirement is necessary.

Licensing, Certification and Training of Marine Personnel

Recommendation: A key to preventing marine accidents is a well trained and qualified crew since, according to the U.S. Coast Guard (USCG), more than 80% of all accidents are caused by human error. The industry supports high training standards for all marine personnel and urges that the International Convention on Standards of Training and Certification of Watchkeepers (STCW) be ratified by the U.S. Senate. In addition, improvements are needed in U.S. Coast Guard training requirements for cargo handling and bridge management.

This treaty will require that all personnel on vessels calling at U.S. ports meet specified training and sea service requirements and will permit the U.S. Coast Guard to exclude those vessels that are substandard. As an example, the convention requires that individuals have three years of sea service before they can be in charge of a navigational watch. The convention also contains extensive recommendations for tanker personnel qualifications.

Status: The STCW treaty still awaits Senate consideration.

In August, 1989, API coordinated the initial bridge management training program sponsored by the U.S. Merchant Marine Academy, Kings Point, N.Y. This simulator based training is designed to improve watchkeeping standards and is proposed for use by operating companies.

Application of simulator training, as well as other industry-wide training, is presently being pursued by the newly formed API Task Force on Marine Personnel. The task force is developing a bridge management training guideline which will be circulated and finalized in coming months, and work has begun on a cargo handling guideline as well. This task force's work will be applicable to both U.S. and foreign tank vessel operations, and consideration is being given to expanding into the areas of emergency response and specialized training for shoreside personnel.

There is a continuing and growing interest in improved training and certification internationally as well. For example, the Norwegian Shipowner Association is promoting a voluntary quality program for shipping companies. The Norwegian government is said to be considering making the program mandatory for ferry boat owners and then, possibly, tanker owners.

Drugs and Alcohol

Recommendation: U.S. Coast Guard authority should be expanded to allow for drug and alcohol testing as a part of officer licensing procedures. Company policies should be established to determine substance abuse and to encourage treatment.

Status: Abuse of drugs and alcohol by marine personnel is inconsistent with marine safety. The industry is clarifying or refining present company policies to prevent substance abuse and to encourage treatment. We support expanding industry and U.S.

Coast Guard mandatory drug and alcohol testing and enforcement of random testing which at present is enjoined by federal court order.

Automatic Pilot

Recommendation: Alarm systems for automatic pilots should be retrofitted on all tankers.

Status: Individual companies are already moving on this initiative where present equipment does not have this feature.

Shipboard Oil Spill Response Capability

Recommendation: Ship specific oil spill prevention and control contingency plans should be required. However, currently available shipboard oil spill response equipment is not effective and can present serious safety hazards in deployment. Research is proposed to investigate feasible and safe techniques for onboard response.

Status: The need to respond quickly and effectively to an accident is critical to preventing or limiting an oil spill. The industry is developing and refining ship specific oil spill prevention and control contingency plans, and supports the applicable provisions in the oil spill legislation requiring such plans.

The industry is also prepared to support research to investigate feasible and safe techniques for onboard response. The Marine Transportation Committee intends to request that the Petroleum Industry Response Organization (PIRO) conduct high priority research on ship specific oil spill response capabilities.

Vessel Configuration

Recommendation: The merits of full application of ballast sides, reduced tank size and double bottom construction should be carefully studied by the National Academy of Sciences (or another independent body).

Status: The need to redesign tankers and tank barges to make them more oil spill proof is a high industry priority. The industry has provided input and assistance to the Coast Guard sponsored National Academy of Sciences (NAS) study on tank vessel design which will be completed later this year.

Additionally, the industry will sponsor a "Forum on Alternative Tank Vessel Design" on June 5, 1990, in Washington, D.C. This is an open door forum on new or innovative methods to prevent oil pollution. Over 20 new concepts will be presented, ranging from variations on the concept of double hulls to methods to contain oil if a tanker accident occurs.

An example of the type of concepts which will be presented at the forum is that of the largest Japanese shipbuilding company, Mitsubishi Heavy Industries. Mitsubishi proposes building tankers with wide ballast side tanks and center cargo tanks fitted with a horizontal deck midway in the tank. Such a design may reduce pollution from high and low energy impacts from collision and grounding incidents and limit hydrostatic losses from the centerline cargo tanks. This concept may also reduce the operational and salvageability problems which can be posed by conventional double hull vessels, such as by allowing easy access for tank inspections.

Mitsubishi's idea is one of many innovative concepts which will be presented at the forum and, Mr. Chairman, I cordially invite you, other members of the subcommittee, and your staff to join us on June 5th. We will submit a copy of the forum proceedings to this subcommittee as soon as it becomes available. All presentation material will also be submitted to the NAS for consideration.

Vessel Operations

Another area of significant potential benefit is traffic rerouting. In areas where substantial hazards exist, the industry is reviewing traffic patterns to determine if alternative traffic routes can be developed. In response to local concerns, the industry has agreed to reroute traffic in California's Santa Barbara Channel and the Straits of Florida in order to minimize potential hazards. The industry will consider such rerouting wherever potential hazards exist.

Future Efforts

We believe the industry is moving aggressively in the right direction in an effort to prevent oil spills from tank vessels. However, as you are aware, much remains to be done.

The Congress can take a major step forward in preventing future tanker oil spills by utilizing some of the $28 million earmarked in Title VII of H.R. 1465 to fund research and development which specifically addresses operational safety, tanker construction, and methods to contain and control oil in a tank vessel if an accident occurs.

As a starting point, several concepts to be presented at the June 5th Forum could be worthwhile pursuing as government-financed or assisted research projects. By the end of June 1990 we should be in a position to recommend specific projects if the subcommittee so desires.

In addition, a joint industry-government research project is presently underway to develop the concept of electronic charts. The Woods Hole Oceanographic Institution (WHOI) and the Radio Technical Commission for Maritime Services (RTCM), have organized a research project to test and demonstrate the use of an improved shipboard navigation system. The system will integrate shipboard navigation aids, including radar, onto an electronic chart. The new system will greatly aid navigational safety and will be considered a legal document like paper charts today, based on the newly issued IMO provisional standard.

This project will last for three years, and will require an expenditure of $2 million. The U.S. Coast Guard has agreed to contribute $300,000. Industry support is required for the remaining funding. Exxon shipping company has agreed to contribute $300,000. The remaining $1.4 million in necessary funding is being solicited.

In closing, I would like to reiterate the need for increased public funding for research and development in the area of operational safety. While industry is pursuing improved personnel training and vessel design, the government should vigorously address improvements in vessel traffic systems, pilotage, navigational aids, facility design, and waterways management. Research in these areas can best be accomplished by the federal government and will ultimately lead to a safer marine transportation system and help prevent oil spills from happening.

Thank you, Mr. Chairman. I will be happy to answer any questions you may have.

Mr. TORRICELLI. Thank you, Mr. Roland and Mr. Walker.

I will remind you, this is of course a research subcommittee, not a maritime committee involved in procedures of managing the trade, but rather looking at ways to improve the technology in the operation and transportation of oil. That is our focus, and that of course will be the subject of my questions.

Mr. Walker, describe for us, if you could, the economic judgments that your company faced in making its decision to employ double hulled tankers, the cost differences as you recognize them both in terms of construction and operation and any offsetting benefits in terms of insurance?

Mr. WALKER. Okay, without being too specific, two vessels, the two 95,000 ton vessels that we have currently ordered, combined are costing in excess of $100 million. The difference between—we had then specifically looked at single hulls and double hulls so that we could tell the difference—and it was approximately a 15 percent increased cost up front on the double hulls. We work economics on tankers the same as we work economics on any other large investment that we make.

We certainly have to take into consideration the environment. That 15 percent, done on a pure economic basis, didn't substantially decrease our economics. Even if it had, when you weigh that against the potential for damage to the environment, we chose to go in that direction. So, in the long run, we felt, in our circumstances, it will have no huge financial impact on us.

Mr. TORRICELLI. Did you find any offsetting benefits on insurance or ships or in the operations or in the lending procedures for the construction of the ships?

Mr. WALKER. Well, the lending procedures are still being worked on. The insurance question has not been answered simply because the ships are just now being constructed, or will be constructed, starting soon, so those negotiations will be ongoing. It is our hope and desire that both of those things will be of a benefit to us, but were not figured into our economics. But we're most hopeful that both insurance and financial arrangements will be superior.

Mr. TORRICELLI. I assume, from the experience of other companies that have operated double hulled oil tankers and double hulled ships operating in transport of other potentially hazardous cargoes, you have felt that the evidence was sufficient that in terms of the safety of operation, the cost of salvaging, that the technical questions were sufficiently answered to make this judgment?

Mr. WALKER. We believe that to be so. We talk about the study that's currently being done by the National Academy of Science—if good science comes out of that that tells us that something is different than we saw it, of course we would certainly have to consider that, but we don't anticipate that. And the history that we have in the shipping business would indicate that double hulls in the products business, in the chemical business, in the LPG business is a known technology, if you will, so we don't see a good deal of risk on our part.

Mr. TORRICELLI. You didn't make a $15 million judgment, then, if you thought there was any ambivalence about the evidence from current operation of double hulled ships?

Mr. WALKER. No, one of the major concerns on double hulls has always been the possibility of the internal tanks leaking and the creation of gas and the causing of explosion in the double hulls. We have that same kind of thing on a much, much smaller scale in our inland barging operations, but even there, we're going to double hull. We have operated double hulls in crude oil in the barging, but I'm talking tanks only of maybe 30,000 barrels, but we've had no problems, no increased difficulty. We're headed in that direction along those lines, also.

Mr. TORRICELLI. The technology to monitor the space between the hulls for potential leakage and buildups cannot be a difficult technology.

Mr. WALKER. It's gas detection, certainly. And it's a technology, although bid on a different circumstances, but it's primarily the same technology that we use in our refineries and in our pipeline operations.

Mr. TORRICELLI. Mr. Walker or Mr. Roland, this being a research committee, our interest in having some of these technical questions finally answered after all the years of debate and apparently conflicting findings, we made a judgment to have—that this National Academy of Science study is not sufficient. We wanted to finally answer some questions about competing and different technologies. Where domestically do you consider to be the best depository of Federal funds and trusts here? What institutions of the Government or private university or other facilities are in the best position to evaluate the kinds of approaches Mr. Walker outlined?

Mr. ROLAND. Well, I'm not really sure of the answer to that. I would think that some of the research that has been proposed so far and is focused in the direction of spill prevention and whatnot is probably a pretty good model to work from, but I would suggest that some of the schools in this country are capable of conducting some of that research. There's a broad interest world-wide in this. This is not just a U.S. question and problem. I would suggest also that perhaps some sort of international agreement on research into this area would be helpful and would benefit future laws and regulations in the world community.

Mr. TORRICELLI. Of course there's an enormous difference in the world community in sensitivity of the environmental problems and the willingness to commit resources to them. Scandinavian nations have a considerably higher standard than our Nation has been willing to do. There are no doubt some developing countries that will be willing to accept little or no cost to change their procedure.

So, I too would like to see international cooperation, but I think it may not be very likely to move things forward very much in our country.

This—since Amoco has not made a judgement to have double hulls, have you looked at some of these questions of materials, of bladders within the hulls of your ships?

Mr. ROLAND. We know that the National Academy of Science's research in this area is covering that particular issue, that and many structural issues as well.

Mr. TORRICELLI. But as a company, yourself, you have not reached any conclusions?

Mr. ROLAND. With respect to bladders, no.

Mr. TORRICELLI. How many single hulled ships, and what would their average age be, that you're operating now, Mr. Roland?

Mr. ROLAND. That we're operating?

Mr. TORRICELLI. Yes.

Mr. ROLAND. We're operating 19 single—18 single hulled and one double hulled vessel.

Mr. TORRICELLI. How much life is left in those single hulled?

Mr. ROLAND. Well, some of them are fairly old, 19 or 20 years old. We expect that those will be sold in the immediate future. We have some new ships. We just completed a new building program. The new building program was designed to provide for some smaller ships, the same size that Conoco is building, basically. Our emphasis in that design was to build for collision protection. These are vessels that enter and depart U.S. ports. We consider the potential of collision, particularly in the operating area, which is the Gulf of Mexico, to be higher than grounding, therefore we built vessels with collision bulkheads on the sides. We carry no cargoes adjacent to the water on the side of the vessels, only on the bottom.

Mr. TORRICELLI. During this decade, you will largely be replacing your single hulled anchor fleet?

Mr. ROLAND. Right.

Mr. TORRICELLI. But at the moment, neither the economic incentives nor the technology are sufficiently attractive to you to be approaching a decision to use double hulls or a bladder approach?

Mr. ROLAND. We do not feel that the technology associated with double bottoms is compelling. We think that there are some real problems with it. Bob has already mentioned the issue of gas collection in the double bottom areas. I know of two instances of vessels which have been lost because of that particular problem. We think that the problem with salvage is a very significant issue which has to be resolved. We think that despite the slowness of the development, there are some ideas that might prove to be better. I mentioned in this oral discussion that Mitsubishi Heavy Industries is presenting an idea to the National Academy of Science.

Mr. TORRICELLI. You did, but it was not clear to me what the idea was.

Mr. ROLAND. The idea is that they're designing a ship which is basically similar to the ones that we had just finished the construction program on, which means that they are designed with collision sides, collision resisting sides, and the vessels in the center tank will be divided by a floor so that there will be over and under compartments in the center of the ship. Should there be a penetration in the bottom of the hull, because the hydrostatic head in the water outside is greater than the hydrostatic head of the oil in the inside, the oil can't escape. Basically, it's a leak—not a leak-proof—but it's a leak resistant kind of design which we think doesn't have the defects of the double hulled design. It has considerable merit.

Mr. TORRICELLI. Have they constructed any of these ships to date?

Mr. ROLAND. No, this is a proposal that they're making to the National Academy of Science. This is their idea which was fostered by the invitation by the National Academy of Science to present ideas.

Mr. TORRICELLI. Mr. Campbell?

Mr. CAMPBELL. Thank you, Mr. Chairman.

Mr. Walker, do I understand you that Conoco has retrofitted all of its tankers as well, or is the commitment for double hulling just for all new.

Mr. WALKER. It's for all new. We have not retrofitted.

Mr. CAMPBELL. All right, thanks.

Can you give me an estimate of what percentage cost— this may be hard for you, but let me ask you—what percentage increment in total cost of operations Conoco incurred by this decision?

Mr. WALKER. Well, I think you're asking the question on an operating costs basis.

Mr. CAMPBELL. That's just the problem.

Mr. WALKER. It's insignificant other than the capital up front. The operating costs of the vessels would be insignificant as a part of our total cost.

Mr. CAMPBELL. So you had no effect on your shareholder dividend or any retained earnings or any of that?

Is it Conoco's request, if we were the appropriate Committee with such jurisdiction, to request that—to compel all your competitors to do the same as you have?

Mr. WALKER. No, we're not prepared to do that. As I said in the beginning, we looked at the way that we operate in the areas that we have to operate under, and what our circumstances are, and we said that double hulls will best fit that service. We feel quite comfortable with it. I certainly would not make it mandatory that anybody else did that if they felt that their business was different. They would have to make that decision themselves.

Mr. CAMPBELL. That's a commendable amount of understanding for your competitors. Frequently we hear folks saying, "Since we did it, let's make everybody else do it," and then perhaps the outcome isn't as desireable. On the other hand, if there is something that is desireable for everybody to do, sometimes Government should intervene to require it so that the courageous who goes first doesn't suffer as a result.

I want to ask all three of the gentlemen at the table, perhaps even Captain Valdes would be the most appropriate to respond to this, what is the most common cause of a tanker mishap? I can suggest several—bad sonar, bad radar, human error, fatigue. What is the most common cause of the spills that we have had?

Captain VALDES. In terms of pollution, rupture of the bottom is the most common cause for spills. In terms of mishaps in vessels, I believe human error is the main concern.

Mr. CAMPBELL. So I have strain in the materials as the reason for the rupture of the bottom?

Captain VALDES. That is correct, yes.

Mr. CAMPBELL. And then human error for the collisions?

Captain VALDES. Yes, for the accident.

Mr. CAMPBELL. Pardon me, but I don't think I quite understand. By strain in the material, you mean that the ship has sailed too many times?

Captain VALDES. No, I don't mean that. By strain in the materials I mean, you know, rupture of the hull by collision contact with objects or, you know, anchors, obstructions, this kind of thing.

Mr. CAMPBELL. This strikes me as a potential human error, then. The collision happened by human error and it ruptured because the strain was greater than the material could withstand.

Captain VALDES. That is correct.

Mr. CAMPBELL. Then, at the risk of putting words in your mouth which I don't wish to do, is it your opinion that human error is the overwhelming reason for polluting spills that we've had from oil tanker accidents?

Captain VALDES. I believe so.

Mr. CAMPBELL. Is it operating error, or is it human error of the nature not adequate inspection of the vessel before it leaves port?

Captain VALDES. No, I don't believe it has anything to do with inspections, but pure human error. Ships, they are in a very harsh environment. The powering vessel, there is not a power ratio, the power versus the size of the vessel is not the best. Vessels are not like planes. You throttle and you have tremendous power. In some circumstances they are uncontrollable, they become uncontrollable. Whether you assign this as a human error or not, humans are handling these vessels whether you anticipate or not. But humans are involved in most, in my opinion, of the accidents in tankers or any ship.

Mr. CAMPBELL. When you say human error, are you speaking of avoidable human error? That is to say, had the master properly read the monitoring instruments the accident couldn't have occurred.

Captain VALDES. Better qualifications, yes.

Mr. CAMPBELL. That's very chilling.

Thank you, Mr. Chairman.

Mr. TORRICELLI. Thank you.

Mr. Rohrabacher?

Mr. ROHRABACHER. Thank you, Mr. Chairman. I apologize for being late. Being a congressman with five things to do in every one time slot, sometimes I have to run between two or three things, as my colleagues face that same challenge. I'm sorry that I missed your testimony. If my questions in some way are involved with what you've already testified to or have already been asked, please don't hesitate to interrupt.

If there would have been—if the Exxon Valdez would have been double hulled and gone through the same trauma that it did on the rocks, would there have been a massive spill?

Mr. WALKER. I think that was commented on a little earlier and anything that I would say would be pure speculation other than to quote the Coast Guard, who have been quoted in the paper, and I think their numbers vary from 25 percent to 60 percent possibility of less oil out. But it's speculation on my part.

Mr. ROHRABACHER. So there's a good chance that even with double hulling that the Exxon Valdez would have still spilled a considerable amount of oil?

Mr. ROLAND. Can I pick up on that a little bit?

Mr. WALKER. Yes.

Mr. ROLAND. The shipbuilder which built the ship, National Steel in San Diego, ran some various design scenarios on double hulling that ship. In three out of the five scenarios, they concluded that the ship would have been lost, that means the entire cargo lost. In

the two other scenarios, perhaps there would have been less, I'm not sure what the quantities were. But the significant finding was that there was a potential of totally losing the vessel.

Mr. ROHRABACHER. The—

Mr. TORRICELLI. Mr. Rohrabacher, if you would yield for one second—

Mr. ROHRABACHER. Yes, sir.

Mr. TORRICELLI. Mr. Roland, you might know that, having been engaged in this debate on the House floor when we proposed double bottoms, that indeed was the initial judgment of the shipbuilder. You should know that they corresponded with us later, however, and took a very different position and concluded that, in fact, the ship would not have been lost and it would have resulted in significantly less oil. I cannot produce that documentation for you, but that documentation was received for the debate, though indeed you are accurate. At one point during the course of it, they did take that position on it.

Mr. ROLAND. Can I say also that I was not aware of the—

Mr. ROHRABACHER. Sure, but the transport of oil by tanker, is it not inherently risky? We're talking about these huge ships carrying just humongous amounts of oil out there. Isn't that, whether you have a drunken captain, or the best laid plans of everyone often go astray? Doesn't this inherently have major risks involved?

Mr. ROLAND. It's fair to say that there is some risk involved. The business of managing this kind of operation— it's our job to minimize the risk that associates with that. Everything has some degree of risk. Everything that you do carries a risk. This is one of those things that has some significant risk to society.

Mr. ROHRABACHER. Well, just as an oil company professional, would you say that there is less risk involved in getting the same amount of oil from an off shore oil well than from carrying that oil from Alaska to California by tanker?

Mr. ROLAND. I think historically it has shown itself to be safer to pipeline it ashore, at least in terms of spills.

Mr. ROHRABACHER. I think that—just as one comment that you might comment on—I represent a coastal area that recently had an oil spill, and I couldn't help but notice that there was off shore oil rigs that had been there for 20 years and never spilled a drop, yet we have an oil tanker there spilling all sorts of oil on our beach. Many people who may be very concerned about the environment by opposing off shore oil development have actually put us in a position of depending on a more risky source of oil by hindering our development of off shore oil resources. Do you have any comment on that?

Mr. ROLAND. I think it would really be unfair for me to comment on that. I'm not really in a very good position to do so.

Mr. ROHRABACHER. Have you heard anything about jumbo barge carrier technology?

Mr. ROLAND. Jumbo barge, meaning?

Mr. ROHRABACHER. There's an American, I guess a Swedish-American, Captain Turnquist, who designed the first roll-on roll-off ships who has a design which would be the ultimate double hulling in the sense that the ships, the large jumbo barge carriers, would be carrying barges of oil or whatever. In a situation like that

where a ship would go up on the rocks, the barge would float off rather than being a double hulled vessel.

Mr. ROLAND. I must say that I haven't heard about that idea.

Mr. ROHRABACHER. Do you think that that concept possibly would provide a safer method of transport rather than just simply double hulling vessels?

Mr. ROLAND. I'm not sure. That's very difficult to appraise. The idea is similar to the idea of the LASH vessel which carries barges on board and just the cargo would be oil rather than something else. I don't know. It's hard to judge. If you get into a situation where the weather was wrong or where the shoreline conditions were wrong, you could lose the entire vessel. It wouldn't make any difference whether it was contained in barges or not.

Mr. ROHRABACHER. In terms of human error and the licensing of captains—of course the world's attention was riveted on the fact that he might have been—the captain of the Exxon Valdez may have been drunk. I guess he was found innocent of having that actually affect the accident. But do you believe that there is adequate training of your captains of these large tankers? Could that be beefed up? Would that cut down the potential of spilling oil on our shores?

Mr. ROLAND. I'm not sure—when you ask the training, yet you were talking about drug and alcohol abuse.

Mr. ROHRABACHER. I'm leading into that.

Mr. ROLAND. Okay. The licensing procedures, I think, are probably adequate for merchant mariners. There is more training that could be done and should be done. We had a PI — we're sponsoring a program which will provide a significant upgrade in bridge management training for at least mariners associated with our group. We also feel that it's important to focus on the issue of the pilotage and how well those pilots are licensed and disciplined. We think that there are some problems there and we are working with the American Pilots Association to provide for them to establish some voluntary national standards which would provide for training as well as drug and alcohol and some of the other issues that we think confront the issue.

Mr. ROHRABACHER. You say voluntary standards. Is there a mandatory drug and alcohol testing for these pilots?

Mr. ROLAND. No, there is not. I think most of them have programs. They may all have programs, but there are not mandatory programs.

Mr. ROHRABACHER. Do you believe that a mandatory program established by Congress of drug and alcohol testing for people who are involved in the command or piloting of these large vessels would be beneficial?

Mr. ROLAND. It exists today. For pilotage, it doesn't. For everybody else it does.

Mr. ROHRABACHER. But it's not mandatory.

Mr. ROLAND. It's not mandatory for pilots, but it is for U.S. flag ships and foreign ships following an accident.

Mr. ROHRABACHER. But not before?

Mr. ROLAND. Not before for foreign flag, not before.

Mr. ROHRABACHER. You're going to have to explain a little bit for me here. How would you change the drug testing laws today to make the public safer? What would you do?

Mr. ROLAND. I think the drug laws and drug regulations which were recently passed by the United States are perfectly adequate for American flag vessels. I think we need to remove the constraint of random testing. We should be able to random test. But otherwise I think the regulations are sufficient.

With respect to foreign vessels—

Mr. ROHRABACHER. Can I interrupt here? Are you permitted at this time to test your people before an accident?

Mr. ROLAND. Yes, on U.S. flag vessels.

Mr. ROHRABACHER. Okay.

Mr. ROLAND. Now foreign flag vessels are different. We do not have jurisdiction, the Coast Guard and the United States do not have jurisdiction on board except post accident. So post accident we have the right to do drug and alcohol tests. Prior to is where improvements could be made and that would be dependent upon an international agreement.

Mr. ROHRABACHER. And finally, in the area of cleanup technology, do we have the technology needed for an adequate rapid response to a major spill from a tanker? Do we have the technology, or is this something the Congress should look into in terms of investing and developing. I noticed these oil spills off my district and frankly it was a little bit disturbing to see these men walking along the shore with these rags that soak up this stuff. I said to myself, "This might be something that could have been done 50 years ago." Is there adequate—has there been adequate technological research?

Mr. ROLAND. In my opinion, we have a long way to go in oil spill cleanup. As a part of the Petroleum Industry Response Organization, PIRO, which has been established to provided for response and research, there's going to be a considerable amount of money that is dedicated to research in the area of technology for cleanup and some of the new biological agents which might be available to us.

Mr. ROHRABACHER. So you think there's going to be more money spent in the private sector on this?

Mr. ROLAND. Quite a bit more.

Mr. ROHRABACHER. And perhaps you could keep us informed. I know I, personally, would be very interested in this research project in the private sector.

Mr. ROLAND. The Department of Interior also has a program. I think it's a $10 million program. The PIRO program is a $35 million program over three years.

Mr. ROHRABACHER. I would certainly appreciate being kept informed.

Mr. ROLAND. Yes, sir.

Mr. ROHRABACHER. If you could contact my office with any information about this we'd appreciate it.

Mr. ROLAND. We will.

Mr. ROHRABACHER. Thank you very much, Mr. Chairman.

Mr. TORRICELLI. Mr. Roland, did the best of potentials for that cleanup involve bio-organisms?

Mr. ROLAND. Well, I'm really reaching when I give you an answer, because I'm not really qualified to do it. But it seems to me that this is one of those major steps forward, a possibility.

Mr. TORRICELLI. The money, the resources being used by PIRO—largely is this work being done in house institutions or in cooperation with universities.

Mr. ROLAND. PIRO has not started the program yet. We are waiting for Congress to decide the oil spill legislation. But when it starts it will be done by private institutions and monitored by PIRO.

Mr. TORRICELLI. If, Mr. Roland, the National Academy's report is clear in its conclusion that the double hulled tankers are, at least at this period, the appropriate answer, confirm previous accounts, what will the response of your company be?

Mr. ROLAND. We would, obviously, build double hulled tankers in the future.

Mr. TORRICELLI. This of course is a scientific judgment, assuming that the Congress took no actions to mandate it, should be providing information—I want to make sure you understood.

Mr. ROLAND. I understand perfectly. Our resolve is that we will decide on the basis of the National Academy of Science's recommendations.

Mr. TORRICELLI. Part of the mandate of being a member of Congress you can ask questions that you know people have no potential to answer—

[Laughter.]

Mr. ROLAND. I'll be glad to give it a try anyhow.

Mr. TORRICELLI. I'll just ask in that spirit. Other major oil companies—is it your anticipation that would be their likely response as well?

Mr. ROLAND. I think that it would be very unfair for me to answer that question except in a very general sense. When the Task Force on Oil Spill was reported out in June of last year, I would judge that it was the general feeling of the members of that Task Force that they would comply with the National Academy of Science's recommendations.

Mr. TORRICELLI. Why is the insurance industry and the lending institutions not being more responsive. I see their interests in this as being fairly clear.

Mr. ROLAND. I think that the insurance industry is monitoring this very closely. Of course there are a lot of double hulled ships. I think their judgment is somewhat like ours, that is that they do not see any dramatic improvements that flow from the issue of double bottoms with respect to oil spills. I think they're very skeptical.

Mr. TORRICELLI. Though one could say that the sampling of tankers with double hulls for oil, relatively small—

Mr. ROLAND. Well, there are quite a few product tankers, and most of them are double hulled, although—

Mr. TORRICELLI. As a layman, my understanding is that there have been few to none incidents where having a double hull has been a complicating or a negative factor.

Mr. ROLAND. In salvage?

Mr. TORRICELLI. Salvage, or in operations?

Mr. ROLAND. In operations, as I mentioned before, I think we can verify that there have been several ships that have been lost because of gasses leaking into the double bottom spaces and explosions occurring because of that.

With respect to salvage, I think that one of the issues that NAS is looking into is, statistically, whether vessels with double bottoms have been lost by foundering more often than single hulled vessels. There are enough double hulled vessels around so that you can get something statistically significant and they're going to be looking at that.

Mr. TORRICELLI. Is it not possible that for salvage purposes, having a double hull with elements of air tight pockets in it provide opportunities to assist in salvage?

Mr. ROLAND. That's hard to judge. I think you'd have to get an expert on that one. My reaction is that the major detriment to double hulls is that you flood the double hull space when you come aground. That lowers the ship in the water and makes it more difficult to move away.

Mr. TORRICELLI. I understand that.

Mr. ROLAND. As long as that situation exists, I think it would still maintain the same kind of problem.

Mr. TORRICELLI. Do you, Mr. Walker, consider that your company has undertaken any kind of a competitive disadvantage by making this decision or is the trade sufficiently large that it can be absorbed and go into a marginal impact?

Mr. WALKER. We don't think we'll be at any competitive disadvantage at all. In fact, with the initiative that our company and our parent company, DuPont, has taken in the environmental issues, I guess that you could say that what we strive for is to be a supplier of choice. One of the things that makes you a supplier of choice is your reaction to the environment, how you treat it, how you earn your business. This is just another one of those steps in that direction that we're going to be environmentally responsible citizens.

Mr. TORRICELLI. Finally, if we had to— this judgment that the Conference Committee is not going to make about—if it retains the language for double bottoms that I offered— we'll have to address the period of years for the phase in. Looking at the economics, Mr. Roland, your company, as I'm sure you have, do you have a period of time that you think permits this cost to be absorbed that makes it economically attractive?

Mr. ROLAND. I would judge that for some period of time the double hulled vessels, the more expensive vessels will probably not pay back the owner as a single hulled vessel would. But, as Mr. Walker has already stated, it's not a significant issue. For us, I just want to emphasize, although Conoco is making their judgment on the basis of an environmental position, so are we. It's a different answer to the question. And we are certainly as sensitive to the environment—

Mr. TORRICELLI. I understand. If this language were to be accepted by the Conference Committee, would you largely be facing a decision of scraping all your single hulled tankers, or would you contemplate fixing them with a double bottom—

Mr. ROLAND. We agree with the Coast Guard's conclusion on that. Retrofitting double hulls is a very dangerous process.

Mr. TORRICELLI. So you would in fact just be looking at—

Mr. ROLAND. Vessels would have to be scrapped if there were not a time that permitted you to finish their original economic—

Mr. TORRICELLI. Before your domestic service ships, are you convinced that both the capacity and the technology exists to build new double hulled tankers in the United States?

Mr. ROLAND. In the United States?

Mr. TORRICELLI. Yes.

Mr. ROLAND. I would say that's very questionable. You can ask the American Shipbuilders Council. I think they'll give you a different answer. We are very skeptical.

[Laughter.]

Mr. ROLAND. And on a foreign basis, there has been a substantial contraction in capacity, world-wide, in the last 10 years. Our business has been in an economic depression and many shipbuilders have closed. The capacity is reduced. If there were an immediate requirement to replace all the vessels in the world with double hulls, it would take quite a considerable time to get it accomplished.

Mr. TORRICELLI. Thank you. I thank you both for your testimonies. They have been very helpful.

I want to note that I went through this entire hearing without making any reference to Captain Valdes having the name Valdez, being the oil tanker. His ribs must be bruised from years worth of kidding about it.

Thank you, Captain for being with us, as well. We appreciate your statement today.

For our third and final panel, if I could ask to come forward, Mr. Virgil Keith from the Alaska Oil Spill Commission; Peter Noble, Chief Operating Officer, Wartsila Marine; Lloyd Bergeson, Naval Architect and Designer of Liquified Natural Gas Tankers; Peter Johnson, Office of Technology Assessment; Erik Olson, National Wildlife Federation who will be joined by Rich Bechtal; and Sarah Chasis of the Natural Resources Defense Council.

I know it's a great number of people at a single table. We'll try to accommodate everyone.

Joining us—I apologize that we have so many people testifying at the same time, but for a variety of reasons we wanted to hear from each of you.

As you know, prepared statements will be entered into the record. We would, however, appreciate a brief oral presentation summarizing your remarks. Please recognize that we do have an unusual number of witnesses, however, so in consideration to those participating, please do make them as brief as possible so that we can also engage in questions.

To the extent possible, as well, so that it would save time on the questioning, please respond to other things that you've heard in the hearing so far today, since you will obviously be asked to do so.

If we could then begin with Mr. Keith. We appreciate receiving your testimony.

STATEMENT OF MR. VIRGIL KEITH, CHIEF NAVAL ARCHITECT AND MANAGING PRINCIPAL, PCO, INC., REPRESENTING MR. WALTER PARKER, CHAIRMAN, ALASKA OIL SPILL COMMISSION

Mr. KEITH. Thank you, Mr. Chairman.

Mr. Chairman, Committee members, and members of the staff, my name is Virgil Keith. I'm the Chief Naval Architect and Managing Principal of ECO, Inc. of Annapolis, Maryland. As a practicing Naval Architect with over 20 years experience in tanker design, tanker operations, and tanker safety, I have had the pleasure of working with the State of Alaska on various aspects of their marine transportation system since 1975. In that regard, I am here to present the testimony of Mr. Walter Parker, Chairman of Alaska's Oil Spill Commission, who is at home in Anchorage recovering from the stomach flu.

He asked me to first of all thank you for allowing him to present the views of the people of the State of Alaska as well as the Alaska Oil Spill Commission and requested your support in implementing their recommendations.

I might add that, from the viewpoint as a Naval Architect with 20 years experience in this tanker design and point operations, the Alaska Oil Spill Commission's report, which I think all of you have had a copy of, is the most comprehensive, most factual, and most executable report of any of this Nation's marine transportation systems that has been conducted to date, bar none.

Now, I'll present the testimony of Mr. Parker. I will condense this, Mr. Chairman, with your permission, just to make available time for the other members.

Mr. TORRICELLI. Thank you.

Mr. KEITH. This is Mr. Parker's testimony. I'll read it direct.

Mr. Chairman, Subcommittee members, my name is Walter Parker. I was the Chairman of the Alaska Oil Spill Commission which was in existence from June of 1989 to May 8, 1990. It is a seven member body created to investigate the wreck of the Exxon Valdez. In our report, which has been submitted to members of the congress, to the Coast Guard, and to the industry, we have made 59 recommendations for improving the safety of marine transportation systems, of oil and oil products, and for improving response capabilities and technologies used in oil spills.

Again, I have a few extra copies of that executive summary. Mr. Parker also wanted me to acknowledge that his report would not have been possible if it wasn't for the work of your GAO entitled the adequacy and preparation of the Exxon Valdez oil spill, as well as the work of your OTA under the directorship of Mr. Peter Johnson who is here at the table. But it basically took those two documents and a period of four months to develop this report which you have a copy of. I'll leave this one with one of you, it's one extra copy.

In that regard, the Alaska State Legislature, on May 8, 1990, finished a session in which it passed, and is now Alaska State law, 35 of the 37 recommendations which required action on the State level. The major aspects of this legislation was that it brought the State back into a proactive role on the prevention of oil spills, an arena from which it was driven in 1979 by the action brought by

the oil companies of Alyeska in Federal courts on the ground that the State had preempted Federal roles in monitoring oil transportation systems. Thus, since 1979, the State has become just a bystander. It is the State's feeling that the industry and Coast Guard brought less and less attention to the prevention of oil spills and ultimately we suffered the loss of the Exxon Valdez. Thus, the State of Alaska has made it a priority with the Alaska State Legislature to bring back tankers and combat oil spills hopefully in conjunction with a stronger role on the Federal level.

What we now need is to implement the other 22 recommendations that require Federal action. Most important, we hope for the strongest possible actions in three areas of prevention. Again, this keys on the GAO report which says that prevention is the key. But instead of just talking about it, let's do something about it. The State of Alaska was here 15 years ago. It made much the same testimony, and literally nothing was done.

In that regard, we see three major areas. First is the design of the tankers. That includes double hulls. The second is a nationwide vessel monitoring system where the Coast Guard or another suitable organization would treat our maritime ports in much the same fashion that the FAA treats our airports. That's Mr. Parker's analogy coming from the aircraft side of it. And the third is crew training that was talked about earlier by the oil companies. We hope that nothing will done to preempt the strong State response that we've already established in Alaska and is already now our State law, once again for the second time around. This includes ratification of any international protocols and any Federal preemption that would limit the ability of the States to respond independently to an oil spill.

In the matter of tankers, the Alaska Oil Spill Commission has strongly supported H.R. 1465 or stronger in its previous testimony and continues to do so. The age of the U.S. domestic fleet, which I think has been discussed about today indicates to us that it should be substantially replaced with new double hulled tankers not later than the year 2000, not beginning at some of the dates that we now see proposed. International fleets should be replaced at a rate that guarantees that we are not allowing lesser standards from foreign tankers entering U.S. ports than we demand from our domestic fleet. We feel that this is in concert with the Ports and Waterways Safety Act of 1978.

The Committee studied the double hull issue in great depth, greater than any other study that has been done today. We do not believe that there is any safety hazard that is greater than any single hulled tankers. We do believe the record for the past 20 years in double hulls would have prevented oil spills in most of the cases and would have severely limited the amount of oil released from catastrophic spills such as the Exxon Valdez. In particular, we looked at all of the groundings and the collisions within the last 10 years within the State of Alaska that resulted in an oil spill, a comprehensive analysis. Of those, we came up with five tankers, of course the fifth is the Exxon Valdez. On four of those that leaked vast amounts of oil, over 100,000 gallons, they would not have leaked one drop with your double hulled tanker. The Exxon Valdez would have been reduced, by the Coast Guard's own study, from 25

percent to 60 percent. Our independent analysis with a shipyard indicates that it may have been as high as 80 percent.

So instead of having a 10 million gallon spill polluting 1200 miles of beach line, we would have wound up with a 1 million gallon spill polluting an area of 200 miles of beach line, so the cleanup would have been much easier.

The risk analysis shows a dramatic quantum jump in spill limitation when double hulls are introduced. We ask you to remember these figures. In a collision with your double hull, with a Bean on 15 double hull, which means the beam of the tanker divided by 15—if we take the Exxon Valdez, we're looking at a beam of 165 feet, divide that by 15 and we come up with 11 feet, somewhat less than the height of this ceiling is the height of the double bottom—nearly 90 percent of the grounding pollution would be eliminated, nearly 75 percent of the collisions would be eliminated for tankers of about 50,000 tons.

Item number two, we strongly recommend the introduction of a precise navigation system. We feel this is something that Congress can do very quickly that industry can't do. Here, again, I won't read the whole testimony. The Loran C systems are on board, the communications systems are on board, and we retransmit that position of these large oil tankers and other hazardous materials to the shore side base, i.e., the Coast Guard. So you can monitor the position of these as they go up and down the coastline within the port. We feel that is the largest single thing, and that can be done relatively cheap.

The cost of the cleanup at $2 billion, rapidly approaching $2.5 billion in cleanup—we're looking at a cost of less than $10 million to implement this Loran C retransmission for New York, for New Orleans, for California, and get that into existence now. That was tried 15 years ago prior to the pipeline and found successful.

The last item is that our research indicates that many ships are undermanned. We feel that fatigue is a factor. Oftentimes automation is given as a justification for that reduction. Greater attention needs to be given to both manning levels and crew quality. We feel that, although the manning level may be sufficient on the ship itself underway, what's required of those people shore side? For instance, at the loading terminal at Valdez, makes them start that operation of leaving the most dangerous part from Jackson point of the Valdez terminal having already been up 10 to 12 hours. Now they have another 10 to 12 hours, so they're working in that period of time from hour 10 to hour 20 or 24 in the most dangerous waters within Alaska. That's something that has to be considered not only for the time at watch, but underway.

The Commission recommended much greater use of training simulators that is now common in most companies for both bridge crews and engine room training. The cost of simulators are now low enough that small micro computer simulators could be carried on board for underway training.

For my fellow commissioners and myself, I wish to thank you, Mr. Chairman, members of the Committee, staff members for holding this hearing and giving us our opportunity. Once again, the first opportunity was 15 years ago. Now we're back here again, 15 years later to convey this most important message.

Thank you very much.

[The prepared statement of Mr. Parker follows:]

TESTIMONY TO THE COMMITTEE ON
SCIENCE, SPACE AND TECHNOLOGY

SUBCOMMITEE ON TRANSPORTATION
AVIATION AND MATERIALS

Walter B. Parker
Former Chairman
Alaska Oil Spill Commission

24 May 1990

34-400 - 90 - 3

Mr. Chairman, Committee members, my name is Walter B. Parker, until May 8, 1990, I was Chairman of the Alaska Oil Spill Commission, a seven member body created to investigate the wreck of the Exxon Valdez. In our report, which has been submitted to the Congress previously, we made 59 recommendations for improving the safety of marine transportation of oil and oil products and for improving response capabilities and technologies used in oil spills.

The Alaska Legislature on May 8, 1990, finished a session during which it passed 35 out of the 37 recommendations which required action at the state legislative level. The major aspects of this legislation was that it brought the state back into an active role in the prevention of oil spills, an arena from which it was driven in 1979 by action brought by the oil companies of the Alyeska consortium in federal court on the grounds that the state has preempted federal roles in monitoring oil transportation. Since 1979, industry and the Coast Guard brought less and less attention to the prevention of oil spills and the ultimate result was the Exxon Valdez. Thus, we made it a priority with the Alaska Legislature to bring back the state's authority to inspect tankers, hopefully in conjunction with stronger Coast Guard action.

The legislature also upgraded contingency planning for Prince William Sound and other areas of Alaska to unprecedented new requirement levels. Contingency plan holders must have equipment available to clean up an amount equal to the maximum crude oil cargo volume of the tank vessel or oil barge within 72 hours. The time of 72 hours was recommended by the Oil Spill Commission as the time at which massive amounts of oil begin to come ashore under most spill conditions. The maximum crude oil amount for Prince William Sound is 1.8 million barrels. Plan holders for the sound must have within the sound the equipment to remove 300,000 barrels within 72 hours and must have the equipment committed from out of the Prince William Sound region to be on hand within 72 hours to handle the rest of the crude oil volume required in the plan.

In addition, the legislature established a strong public response system with public oversight built in at the local, regional and statewide levels. This response system, which will have depots situated to protect critical environmental areas and a trained response corps on standby, will be brought into action anytime the state determines that the private responder's actions are inadequate. It is designed to work with the private systems and the federal systems existing under the National ongtingency Plan. Each region will have a state or scene coordinator and an incident commander designated to work with the federal on scene coordinator or to take over if no federal response is made to a spill.

I wish to emphasize that this system is also designed to work with ary oversight councils established in federal law and the two proposed councils for Prince William Sound and Cook Inlet now being considered by the Congress will fit in with the state structure smoothly.

A public oversight council to provide a statewide focus on the Alyeska Pipeline, tanker traffic and other terminals and pipelines has been created. A commission to plan and coordinate response systems throughout the state has been created and a technology council to work on new improvements to response technology will work with it.

What we now need to go with this is the federal legislation now pending. Most important we hope for the strongest possible actions in three areas of prevention; tankers, vessel monitoring systems and crew training. We hope that nothing will be done to preempt the strong state response systems already established in Alaska. This includes ratification of any international protocols and any federal preemption that would limit the ability of the states to respond independently to an oil spill.

On the matter of tankers, the Commission has supported HB1465 or stronger in its previous testimony and continues to do so. The age of the U.S. domestic fleet indicates to us that it should be substantially replaced with new double hulled tankers by the year 2000, not beginning at that date as some have proposed. International fleets should be replaced at a rate that guarantees we are not allowing lesser standards from those tankers entering our ports from foreign ports than we expect of our domestic fleet.

The Commission studied the double hull issue in depth. We do not believe there is any safety hazard that is any greater than that of single hull tankers. We do believe that the record of the past 20 years indicates that double hulls would have prevented oil spills in most cases and would have severly limited the catastrophic spills of those ships that were not completely destroyed. Our risk analysis shows a dramatic quantum jump in spill limitation when double hulls are introduced. No other single factor has as great an effect.

We strongly recommend the introduction of precise navigation display systems as rapidly as possible. This system is the cheapest and quickest way to substantially upgrade the system if it is combined with a much stronger vessel monitoring presence by the Coast Guard that establishes tanker lanes where they do not now exist and where tanker are required to stay in those lanes except for departures due to declared emergencies. Captains must no longer be allowed to cut corners on their own initiative to save time. There are too many wrecks in the record where this has been a factor. Whether we use Loran C retransmit or satellite navigation, there is no longer any reason why tankers should not be tracked whereever they are. With the controllers in the vessel traffic centers and the bridge watch looking at the same display, the chances of error leading to either a grounding or collision are dramatically reduced. The cost of this system for the entire nation is substantially less than the clean up costs of a major spill.

We do not believe that an expanded vessel monitoring system, requires great new expenditures unless radar coverage is greatly expanded. If the big tankers and other hazardous cargo carriers, indeed if all big ships, are required to utilize the precise navigation systems and to display their position at the existing vessel traffic centers, the system can be done cheaply. In this system we are trying to prevent groundings of big ships and collisions between big ships; not to prevent traffic conflicts between every fishing vessel and recreational user on the ocean.

Our research indicated that many ships are undermanned, with automation often serving as the justification for it. Greater attention needs to be given to both manning levels and crew quality. The Commission recommended much greater use of training simulators than is now common in many companies both for bridge crews and engine room training. The costs of simulators are low enough now that small ones based on a micro computer could be carried on board for training while underway.

For my fellow commissioners and myself I would like to thank the Subcommittee Chairman and members for holding this hearing and giving us an opportunity to convey the most important of our recommendations.

Mr. TORRICELLI. Thank you, Mr. Keith. Thank you for your testimony.

Mr. Noble, there is a vote in progress, so in a few minutes, we may have to interrupt you to go to a vote.

Why don't we vote now so we don't interrupt you.

You can set up and we'll be back momentarily.

The Committee is in recess.

[Recess.]

Mr. TORRICELLI. The Committee could resume, please.

Mr. Noble, if you would proceed.

Mr. NOBLE. Thank you, Mr. Chairman.

Mr. TORRICELLI. I'm looking forward to seeing all these, Mr. Noble, but please do remember that we do have a considerable—

Mr. NOBLE. I will shorten my presentation, but these are some of the technology that I thought would be appropriate.

Mr. TORRICELLI. I'd be glad to see it. If we could have a little—fine—exactly.

STATEMENT OF MR. PETER NOBLE, CHIEF OPERATING OFFICER, WARTSILA MARINE, INC., VANCOUVER, B.C., CANADA

Mr. NOBLE. I'm Peter Noble. I'm a trained Naval Architect. I run a ship design and consulting company in Vancouver, Canada which is a wholly owned subsidiary of a major European shipbuilder. As such, we've been involved in the design and construction of double hulled tankers for some time and are currently engaged in research toward future designs which I'd like to present.

I have some data that I think will give some interesting information and will further support earlier testimony. This data is collected from two sources, one from Finnish Board of Navigation data for all traffic in the Baltic, and second is from a Finnish tanker owner who operates a fleet of ships, some 30 or 40 ships, the majority of which are double hulled or double bottom ships.

Our data shows that two thirds of the incidents are due to grounding and about one third due to collision. We think this is supportable from the fact that collisions generally happen when you run into something or somebody runs into you. Those are things that you see happening and take avoiding action. With groundings, you can't see shallow water. You have to infer where you are from a chart. At the present time, normally commercial ships are not fitted with systems allowing them to see shallow water ahead.

The second record of data—which 53 occurrences over approximately 20 year period—this is the depth of penetration of the bottom of a ship in a grounding incident, not just tankers, some cargo ships, a mixture of single and double bottom ships. In no case was the penetration more than four feet. In two thirds of the cases, it was less than one foot penetration.

Turning to the specific operator experience, over a 25 year period there were 11 instances of double bottom tankers running aground. In no case was there a spill. In the same period, six single bottom tankers ran aground and there were three spills.

I have another slide, but the estimation is that had the double bottom tankers been fitted with single bottoms, in all but three cases there would have been spills.

I'll approach the safe transport by sea as three points. The first is to minimize the occurrence of the accident. We've talked about crew training, better electronic charting, improved maneuvering of the ships. The second is to limit discharge. This is where the double hull or membrane technology come in. The third is actual measures to cleanup. We think the order of importance is that it is far better to avoid the spill than it is to contain it or have to clean it up.

We believe all of these points are important and to be mentioned by others. Officer crew and pilot training, those are distinct activities. The ships—the pilot knows the water well but oftentimes doesn't know the ship's characteristics. The officers know the ship's characteristics but not the water. There is an interaction and a chance for human error there. Improved navigational equipment—I look around this room and see some impressive technology, a little bit from Canada, too, I noticed. We have the technology for improved navigation. It is generally not installed aboard commercial ships right now for precision navigation. That can be improved.

Improved maneuvering systems—bow thrusters, high lift rudders, controllable pitch propellers to stop ships quickly— generally the majority I believe of U.S. tankers are steam turbine ships which use a separate steam turbine for reversing which allows for 35 percent of the braking effect. That's like having cable brakes on your car these days rather than power assisted.

Mr. TORRICELLI. As opposed to how most others are powered?

Mr. NOBLE. Most tankers built today, most modern tankers would be diesel powered and be able to give close to full power astern.

Standardized maneuvering information—again this is part that has been put forward under IMO but is not yet fully approved that a pilot coming on board would have information knowing how the ship would behave under certain circumstances.

Vessel traffic management systems, shore-based air traffic control systems applied to the water we see as the valuable thing in restricted area. Operation restrictions presently in standing in countries a number of those exist. The limiting of navigation to daylight hours for large tankers, the use of one or two pilots in one or two circumstances—in Denmark there is a requirement for ships over 13 meters that they have to have electronic navigation on board, if they are not fitted then they can rent it—all of these kind of operational restrictions.

Another operational restriction that has been placed in Finland is basically a rebate if you use a double hulled tanker. These are user paid fees, rebate fees available if you carry you oil in double hulled tankers.

Finally, escort vessels are ready in place in Valdez at the present time.

Measures to limit discharge—we think the evidence strongly points to the double bottom and double hull as a way to minimize discharge after an accident has occurred. Vacuum systems and emergency discharge, in conjunction with double bottoms can fur-

ther limit discharge. Outer bottom markings— in very large tankers, it's common practice to mark the underside of the ship on the outside so that when you make an in water survey, you know where you are on the ship, on the thousand feet long white field. Generally that is not done on smaller tankers. We believe that would be a simple thing to do to enhance salvageability of a ship. When a diver goes down, he can see the extent of the damage.

Mr. TORRICELLI. You're talking about no more than simple markings?

Mr. NOBLE. Those are welded on and painted markings to say that this is bulkhead 72—

Mr. TORRICELLI. I see.

Mr. NOBLE. Inert gas pressure boosting systems—most tankers are fitted with inert gas systems to generate a gas which contains no oxygen to put into ballast tanks or into the tops of cargo tanks to minimize collection of fumes. To use that usefully as a salvage tool, it needs to have a higher pressure so that it can actually be used to blow down tanks in salvage cases. Whether those are fitted on board or the ship is adapted to fit those readily, those are things that we would look at.

Two other things that we put on the list because they are measures, but we don't find strong support for from our data is hydrostatic balancing and on board booms and skimmers. In the case of hydrostatic balancing, that's basically only partially filling a tank. That can have ramifications in the stability of the ship, in the strength of the ship because there's sloshing loads in the tank, and it's also very hard to control for the ship's officer or the Coast Guard who might police that to know that the tank is only partially filled to the correct level.

The booms and skimmers, we think, is a case of bolting the barn door after the horse is gone. To carry those on board the ship is not useful. There may be an isolated instance where it is, but the money for those would be much better spent in further opportunities.

Finally, accidents will happen, and as we've heard, the chances are, even with all of those measures, the Valdez incident would have resulted in a fairly major spill. We don't presently have a good capability to recover high seas oil spills. Our capabilities for the major number of spills, which are the harbor spills and river spills, are contained and cleaned up effectively with the tools available. For larger ocean spills, we don't have those.

We've worked on a number of projects looking at oil recovery from vessels of opportunity such as large dredgers. The large dredger we designed and built for the Soviets was used in Prince William Sound, with only limited success, but we gained a lot of valuable data that we're incorporating into new designs.

We have recently designed and built a NAVAIDS tender, for the Finnish Coast Guard that incorporates a built-in capability for oil recovery. We're presently working on two new projects. One is a shuttle tanker with that same capability built in so that the ship will be earning its daily living at some other duty, but in the area where it might be required to act as a ship of opportunity, hopefully only once in every several years.

The final one is the Coast Guard has just last Friday issued its request for proposal for its new class of buoy tender. We haven't yet received that, but in earlier discussions it seems likely that they will incorporate the requirement for oil spill cleanup into that buoy tender.

I think that concludes all I was to tell you at the present time. Thank you.

[The prepared statement of Mr. Noble follows:]

TESTIMONY ON OIL TRANSPORTATION SAFETY

TO THE

TRANSPORTATION, AVIATION AND MATERIALS SUBCOMMITTEE

OF THE

U.S. HOUSE OF REPRESENTATIVES' COMMITTEE

ON SCIENCE, SPACE AND TECHNOLOGY

MAY 24, 1990

PRESENTED BY:

PETER G. NOBLE,
WARTSILA MARINE INC.
VANCOUVER, B.C. CANADA

1.0 INTRODUCTION

Wartsila Marine Inc. is ship design and engineering consulting company based in Vancouver, British Columbia. The company is a wholly owned subsidiary of MASA-Yards, a large shipbuilding company based in Finland. The company has extensive experience in the design and construction of large numbers of specialized vessels including both doubled hulled and double bottom tankers. A list of recent double hulled and double bottom vessels designed and built at the yards is included, together with examples of 20,000 ton and 46,000 ton double bottom tankers.

The company has also been active in the development of ships and equipment for oil spill recovery and examples of some vessels which have been designed and built by the company are also attached to this report.

2.0 STATISTICAL DATA ON TANKER DAMAGE

Wartsila Marine Inc. has been carrying out studies for improved design of oil tankers for some time. The company has been acquiring damage data for such ships in order to ascertain through engineering forensic analysis if useful data can be extracted to give guidance for future designs. At the present time we have access to two fairly complete data sets, one from the Finnish Board of Navigation relating to incidents in the Baltic over the last 25 years, and a second set from a major nordic tanker owner who operates a fleet of 30 to 40 vessels, primarily in northern Europe but also occasionally in North American waters.

While these data are limited some useful pointers can be gained in examining them. For example, in a total of 90 grounding/collision incidents, over two thirds of the incidents involved ships running aground and less than one third involved ships colliding, either with each other or other objects such as lighthouses, piers, etc. Other data we have would suggest a similar ratio in that grounding is a much more likely occurrence than collision.

The Finnish Board of Navigation data further suggests that, when the 53 grounding incidents were analyzed, the penetration of the bottom shell in most cases (i.e. almost 70%) is less than 1 foot and that in no cases is the penetration more than 4 feet. This would suggest that a double bottom of more than 4 feet would protect the environment from oil spills in the case of damage.

The tanker operator database gives similar support to the benefit of double bottoms, with a total of 17 grounding incidents over 25 years. The 11 groundings of double bottom/double hull ships resulted in no spill occurring, whereas the 6 grounding incidents for single bottom ships resulted in 3 spills. When this data is further expanded to include grounding and collision data, it is seen that, in 14 incidents for double hull/double bottom ships, only 1 occurred of oil spill occurred, whereas in the single bottom case 3 spills out of 6 occurred. Further investigation of the actual incidents suggests that, in the case of the double bottom ships, spills would have occurred in all but 3 of the cases had no double bottom been fitted. Charts of these data are presented attached to this report.

3.0 - CURRENT APPROACH

As a responsible ship design and engineering company, Wartsila Marine Inc. currently is active in pursuing a three-phased approach to ensuring the safe transport of oil at sea by minimizing oil spills and the resulting ecological damage. These three categories of mitigating measures are shown in the attached figure.

3.1 Measures to Minimize Occurrence of Grounding and/or Collision Accidents

Not all accidents are preventable. However, the best way to keep the environment safe and to minimize oil spills is to avoid having ships run aground or hit each other or other objects. The attached table shows a list of the measures which can be undertaken to improve the safe navigation of tank vessels. These include enhanced officer, crew and pilot training including repeated training on ship simulators so that all of the people involved with navigation of ships are familiar with the ship response and with the areas into which the ship will navigate.

In addition, it is suggested that the most up-to-date navigation equipment be included onboard ships navigating with hazardous cargoes. These would include radar systems, satellite navigation systems, high precision positioning systems, electronic charting, etc. Many of these systems are currently available in the market place and there is a continuous upgrading and innovation to provide more and better systems.

A further improvement is to have enhanced vessel maneuvering systems available. These would include bow thrusters (sometimes multiple bow thrusters) to provide active turning for the head of the vessel; high lift rudders or similar devices, (a number of these systems are now available and allow the ship to be much more maneuverable in confined waters); and also controllable pitch propellers which would allow higher acceleration and braking of the ship than with standard fixed pitch propellers. Standardized maneuvering information should be routinely available for deck officers and especially for pilots. This information would include rate-of-turn for given rudder angles and vessel speeds so that a pilot might become immediately familiar with the characteristics of the vessel as soon as he boards. At a minimum, this data should be in the form of bridge display charts and maneuvering booklet information; however, it would be possible to use micro-computer displays to allow an interactive understanding of the ship's maneuvering characteristics.

Shore-based vessel traffic management systems are in place in a number of areas of high traffic density. These systems are analogous to air traffic control where vessels entering the controlled area report to a central location whereupon their progress is monitored and they are given directions as to position in channel and speed of approach, and are also kept informed of other traffic in the immediate area which may be interacting with them.

A further way to minimize the occurrence of groundings is to apply operational restrictions. For example, the Swedish Shipping Directorate currently requires that oil tankers over 10,000 tons not navigate during hours of darkness or reduced visibility in certain coastal waters. In addition, in other areas of the world speed restrictions and other types of restriction have been applied to enhance safe navigation.

Finally, the use of escort vessels, tugs or vessels capable of assisting a larger vessel to maintain a safe course, or assisting in maneuvering the vessel if any of the vessel's own systems become inoperable, are a further means of ensuring safety and helping to minimize the occurrence of grounding and/or collision damage.

3.2 Measures to Limit Discharge of Oil in the Event of an Accident

As stated earlier, some accidents are unpreventable even given the measures discussed above. There are, however, features and systems which can minimize the extent to which oil is discharged in the event of an accident. Double bottom and double hull construction can minimize or eliminate the discharge of oil in the event of an accident. If the penetration of the side or bottom shell is less than the depth of the double bottom, normally the double bottom structure will not rupture and therefore the cargo will be intact. Evidence given in earlier sections of this report show that, in most groundings, the double bottom is a very effective way to eliminate the discharge of oil. It has been proposed that vacuum systems (i.e minimizing the discharge of oil by closing off vents to tanks which would not allow air to flow in and, therefore, oil to flow out of bottom ruptured tanks) might be successful. There is some evidence for this; however, at present most tank ships are not set up to allow for quick closure of vent valves in the case of an accident. It is quite possible that, with future requirements to minimize vapor emission from oil tankers, a suitable manifolding for vents will be arranged that could allow either manual or automatic shut-down of vent pipes thus minimizing the outflow of oil. Further, work has been undertaken in Sweden which has developed equipment to allow the pumping of oil from a damaged tank, while that tank is held under vacuum, by the use of a portable piece of equipment that can be installed over cargo tank access hatches.

If a ship does ground or impale herself on rock features, it is important to be able to conduct salvage of that vessel as quickly and as easily as possible to minimize the discharge of oil over a longer period of time. One recommendation is that the outer bottom of tankers be suitably marked so that divers and salvage masters can quickly ascertain the position and extent of damage. If a diver is diving in the area of a damaged ship, it is very difficult for him to reference the damage he finds on the outside of the ship to the actual position of bulkheads and other structure. Therefore, it is difficult to ascertain exactly the extent of flooding and damage and the necessary safe means of salvage of the vessel. A further suggested improvement is that the inert gas systems installed aboard tank ships and used to provide an inert atmosphere in oil tanks should be equipped with a pressure boost system such that the gas generated can be pumped into flooded tanks in order to reduce the water head and assist in the refloating of the vessel.

It has been suggested that hydrostatic balancing (i.e only partially loading the cargo tanks such that, if there is a bottom rupture, water would flow into the tank rather than oil flow out from the tank) is an acceptable means of minimizing the discharge of oil. In our opinion, this would be extremely difficult to place into service for various reasons. Firstly, carriage of partially full tanks means that the bulkheads between the tanks are subjected to sloshing loads and this may not be acceptable structurally on many ships. Secondly, it creates free surface effects which can significantly reduce the stability of the vessel. Thirdly, unless some specific measures are taken to modify the ship, it will be difficult for the ship's operators to be sure that the vessel is only loaded to the maximum partial capacities and it will be equally difficult for the U.S. Coast Guard to police this type of partial loading scenario. Finally, some have recommended the carriage of oil booms and skimmers onboard all oil tankers as an effective preventative measure. We, however, see this as a case of bolting the barn after the horse has gone and feel that the money for this equipment would be much better spent in pro-active preventative measures.

3.3 Measures to Clean Up Oil Spills Resulting from Groundings and/or Collisions

Unfortunately, to date most of the efforts in developing containment and recovery equipment for oil spills has resulted in reasonable capability to contain and clean-up small harbor or river spills but has not, as yet, resulted in a capability of recovering large quantities of oil on the high seas or in exposed coastal locations.

At Wartsila Marine we have been addressing this problem for some time and have produced some designs which we believe point in the right direction for the future. We believe that, in order to recover large spills at sea, it is necessary to employ large vessels which can handle large volumes of water and oil. It has been our approach that water and oil should be recovered together onboard the ship in one operation and then water and oil should be separated onboard the ship in a second operation. This in contrast to many of the small skimmer approaches in which brushes or belts are used to separate the oil from the water at the open water surface. In the case of large spills, we believe it is necessary to have large capacities. Typically, small existing skimmers are 20-40 ft. pontoon type vessels which are totally unsuited for operation in even modestly rough waters. We believe that the proper way to address these large spills is by equipping ships with the recovery systems.

We have recently designed, built and delivered an oil recovery/trailing hopper dredger to the Soviets for their Far East fleet. This ship was used with limited success during the Prince William Sound clean-up. The ship is equipped with oil booms which can be used to sweep the ocean and has onboard oil storage tanks and a large, permanently installed, oily water separator system. This vessel was proposed to be used for offshore oil developments in building of artificial islands and therefore it was seen as appropriate to equip the vessel to handle open ocean oil spills. The vessel is highly maneuverable at slow speed, having twin ducted propellers, an important feature for any oil spill recovery ship. The system of having a loosely slung boom attached to

one or both sides of the ship catching oil in the "pocket" which is then recovered by a standard floating skimmer was not particularly effective under the Prince William Sound conditions; however, use of the vessel resulted in gaining some valuable experience which we are presently incorporating into future designs.

A second much smaller series of vessels have been built for the Finnish Coast Guard. The Linja Class are combined oil recovery/navigation aids tenders. These vessels are equipped with side shell doors and an internal recovery system as well as external booms for sweeping oil and water into the hull. In both the above cases these ships have normal duties to accomplish but are available for oil recovery in an emergency. We believe that this is the most effective way to provide wide area coverage for oil spill. Dedicated vessels of this size would, we believe, be much too expensive in place in sufficient numbers around the coast of the U.S. to be effective. On the other hand, a large number of Government and industry vessels are available in various ports which could be adapted to have onboard oil recovery systems. These might include, for example, the U.S. Army Corps of Engineers large dredging fleet and the U.S. Coast Guard WLM and WLB buoy tending fleet.

In our current work we are developing a 90,000 ton, double bottom, double hull shuttle tanker which has incorporated into the ship the ability to recover high seas oil spills. We feel that such a vessel, which could be used to offload super tankers and transfer cargo into U.S. ports, would be an ideal oil recovery vessel in that it would be working in areas where oils spills are likely to occur; it would be highly maneuverable in order to accommodate its shuttle tanker duties; and it would have a crew onboard who were skilled in maneuvering the ship at slow speed in the open ocean while carrying out oil transfer at sea.

Further, the U.S. Coast Guard is about to issue a Request for Proposal for the design of a new class of ocean-going buoy tender and it is our understanding that the requirements will include a requirement to recover oil on the open ocean. Design sketches and technical information on these vessels is attached.

4.0 CONCLUSIONS:

In summary, Wartsila Marine believes that it is possible to further enhance the safe transport of oil at sea through taking appropriate measures:

- to minimize the risk of grounding and collision
- to minimize the outflow of oil in the event of a collision or grounding
- to improve high seas oil spill recovery techniques and equipment so that quick clean-up can be made of any oil spilled.

We believe that the efforts towards achieving these goals should be proportional to the order they are ranked (i.e. the most significant effort should go towards avoiding collisions and groundings, with less effort going towards the designing of equipment which will be used for the recovery of spilled oil).

WARTSILA MARINE INC./MASA-YARDS

RECENTLY BUILT DOUBLE BOTTOM OR DOUBLE HULLED TANKERS

VESSEL SIZE (DWT TONS)	NUMBER BUILT	DOUBLE BOTTOM/ DOUBLE HULLED	LENGTH (M)	BEAM (M)	DEPTH (M)
8,300	1	Double Hulled	124	19	10
11,500	4	Double Hulled	133	21	11
20,000	2	Double Hulled	145	23	14
46,000	1	Double Bottom	179	32	16
120,000	1	Double Bottom	244	46	22

19 999 TDW PRODUCT/CHEMICAL CARRIER

DESCRIPTION

The vessel has been constructed for the carriage of chemical cargoes, type B and oil products. The vessel fulfils the requirements for crude carrier as well. Twelve center tanks and fourteen side tanks in all. The two aftermost centertanks are arranged as slop tanks and side tanks 2 4 and 6 SB and P are arranged for water ballast. Protective location of segregated water ballast. Four cargo segregations and four cross-pipes.

The single screw vessel has forecastle, poop, transom stern and bulbous bow.

Engine room and deckhouse arranged all aft, accommodation for 30 persons.

MAIN PARTICULARS

Lenght over all	160,90 m	527' 10 5/8"
Lenght between perp.	149,40 m	490' 1 7/8"
Breadth moulded	23,10 m	75' 9 1/2"
Depht moulded to upper deck	14,20 m	46' 7"
Draught, summer load line	10,11 m	33' 2"
Maximum height from BL	44,60 m	146' 3 7/8"

DEADWEIGHT

At summer load line 19999 t

TONNAGES

	Gross	Net
International	13974	7007
Panama	14836,63	10823,36
Suez	14862,46	11976,46

SPEED AND POWER

Trial speed at design draught (10,00 m) with the propulsion machinery developing 6560 kW (90 % MCR) 15,8 knots.

TANKS FOR SHIP'S PURPOSES (100 %)

Heavy fuel oil	1339 m^3
Diesel oil	68 m^3
Lubricating oil	83 m^3
Fresh water	338 m^3
Ballast water	6670 m^3
Miscellaneous	128 m^3

CLASSIFICATION AND REGULATIONS

- Lloyd's register of shipping + 100 A1, chemical tanker cargo type B with list of defined cargoes, SG 1.83 in in 3, 4, 7, 8 center tanks, + LMS, UMS, IGS, ice 1A class 1A
- Rules and regulations of Finnish authorities
- International convention for the safety of life at sea 1974 (SOLAS) with first set of amendments
- International convention for the prevention of pollution from ships 1973 (MARPOL) and protocol of 1978 relating to the same
- St. Lawrence and Great lakes seaway rules
- Suez- and Panama canal navigation rules
- Code for the construction and equipment of the ships carrying dangerous chemicals in bulk, type III vessel (IMCO res. A212 with amendments 1 . . . 9)

CARGO TANKS (100 % VOLUME)

Center tanks (10 tanks)	19254 m^3
Side tanks (4S and 4P tanks)	6784 m^3
Slop tanks (2 tanks)	604 m^3
Total	26643 m^3

Center tanks are coated with epoxy polyurethane.
Side tanks are coated with zinc silicate.

CARGO HANDLING EQUIPMENT

CARGO PUMPS

16 vertical centrifugal deepwell pumps Thune-Eureka CK150, each 330 m^3/h at P 100 mLC, density 945 kg/m^3
- No limits to max. density
- Location one pump in tanks 1–10 CL and sidetanks 1,3 and 5 P & S

Two vertical centrifugal deep-well pums Thune-Eureka CK100, each 120 m^3/h at P 100 mLC, density 945 kg/m^3
- No limits to max. density
- Location one pump in side tanks 7 SB and 7 P

One vertical, centrifugal deep-well pump Thune-Eureka CK150. 330 m^3/h at P 90 mLC, density 1000 kg/m^3
- No limits to max. density
- Location in slop tank SB

CARGO PREHEATER

Ten cargo preheaters Sunrod Bendex BR 200/60x, each 411–355 kW

Eight cargo preheaters Sunrod Bendex BR 200/62x, each 410–355 kW

INERT GAS PLANT

One inert gas aggregate, Maritime protection, capacity 3300 m^3/h dischcarge, pressure max. 0,2 bar

SLOP WATER MONITORING

One slop water monitor Seres S633

TANK CLEANING EQUIPMENT

20 fixed Gun Clean type tank washing machines with cow system for centre tanks

6 portable Tofts & Jörgensen tank washing machine for side tanks

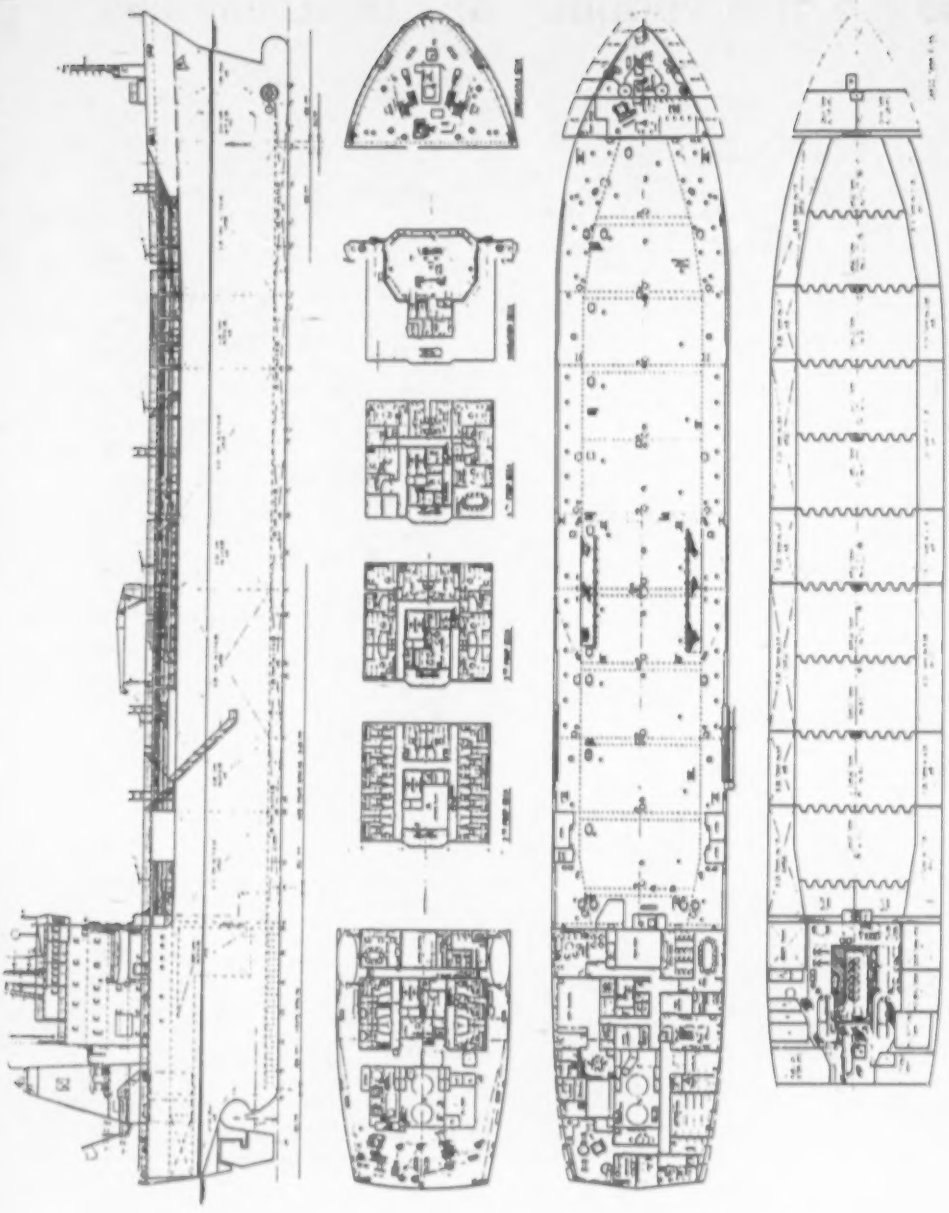
CARGO CONTROL ROOM

- Remote control of filling in cargo tanks
- Remote control of cargo pumps
- Remote indication of ullage levels and temperatures of cargo tanks
- Remote control of ballast pumps and valves
- Loading computer with online connected to tanks

DECK EQUIPMENT

ANCHOR AND MOORING WINDLASSES

Two hydraulic operated windlasses and combined mooring winches Norwinch AMV 57/62–60U3/20 tonnes



46122 TDW SHALLOW DRAFT PRODUCT TANKER

DESCRIPTION

The vessel has been constructed as a shallow draft motor tanker for carriage of petroleum products.
Nine center tanks and twenty side tanks in all. The two aftermost side tanks are arranged as slop tanks and side tanks No. 7 for water ballast. Protective location of segregated water ballast. Four cargo segregations and four cross-pipes.
The single screw vessel has forecastle, poop, transom stern and bulbous bow.
Engine room and deckhouse arranged all aft with the cargo pump room between engine room and cargo tanks.
Accomodation for 33 persons.

MAIN PARTICULARS

Length over all	187,64 m	615'7 3/8"
Length between perp.	179,40 m	588'7"
Breadth moulded	32,20 m	105'7 5/8"
Depth mld. to upper deck	15,70 m	51'6 1/8"
Draught, design	10,36 m	34'
Draught, summer load line	11,62 m	38'1 1/2"

DEADWEIGHT

At design draught	39575 t
At summer load line	46122 t

TONNAGE

	Gross	Net
International	25611 RT	17893 RT
Panama	26924 RT	19865 RT
Suez	26867 RT	22280 RT

SPEED AND POWER

Trial speed at design draught (10,36 m) with the propulsion machinery developing 8500 kW (85 % MCR) 15,1 knots

TANKS FOR SHIP'S PURPOSES (100 %)

Heavy fuel oil	2470 m^3
Diesel oil	256 m^3
Lubricating oil	112 m^3
Fresh water	409 m^3
Ballast water	15334 m^3
Miscellaneous	286 m^3

CLASSIFICATION AND REGULATIONS

- Lloyd' s Register of Shipping +100 A1, Oil Tanke., center tanks 3–6 SG up to 1,5, +LMC, UMS, IGS
- Rules and Regulations of Finnish Authorities
- Convention on the Protection of the Marine Enviroment of the Baltic Sea Area, 1974
- International Convention for the Safety of Life at Sea, 1974 (SOLAS) and protocol of 1978 relating to the same (TSPP)
- International Convention for the Prevention of Pollution from Ships, 1973 (MARPOL) and protocol of 1978 relating to the same (TSPP)
- International Convention on Load Lines, 1966
- Convention on the international Regulations for Preventing Collision at Sea 1972
- Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the United States (CG-515).
- Standards for Tanker Manifolds and Associated Equipment (OCIMF)

CARGO TANKS (100 % volume)

Center tanks (9 tanks)	24985 m^3
Side tanks (8S and 8P tanks)	25690 m^3
Slop tanks (2 tanks)	1475 m^3
Total	52150 m^3

Cargo tanks coated with epoxy paint COLTURIET EHB, manufactured by SIGMA. Coating comprises one 50 my primer and one 250 my topcoat, 300 my in total.

CARGO HANDLING EQUIPMENT

Stainless steel cargo pipelines, AISI 304. Butterfly type valves, stainless steel stem and disk.

CARGO PUMPS

Three electrically driven centrifugal pumps made by J.M.W. JÖNKÖPING
Capacity: 1200 m^3 / h – 10 bar
One steam turbine driven screw pump made by BORNEMANN
Capacity: 1200 m^3 / h – 10 bar

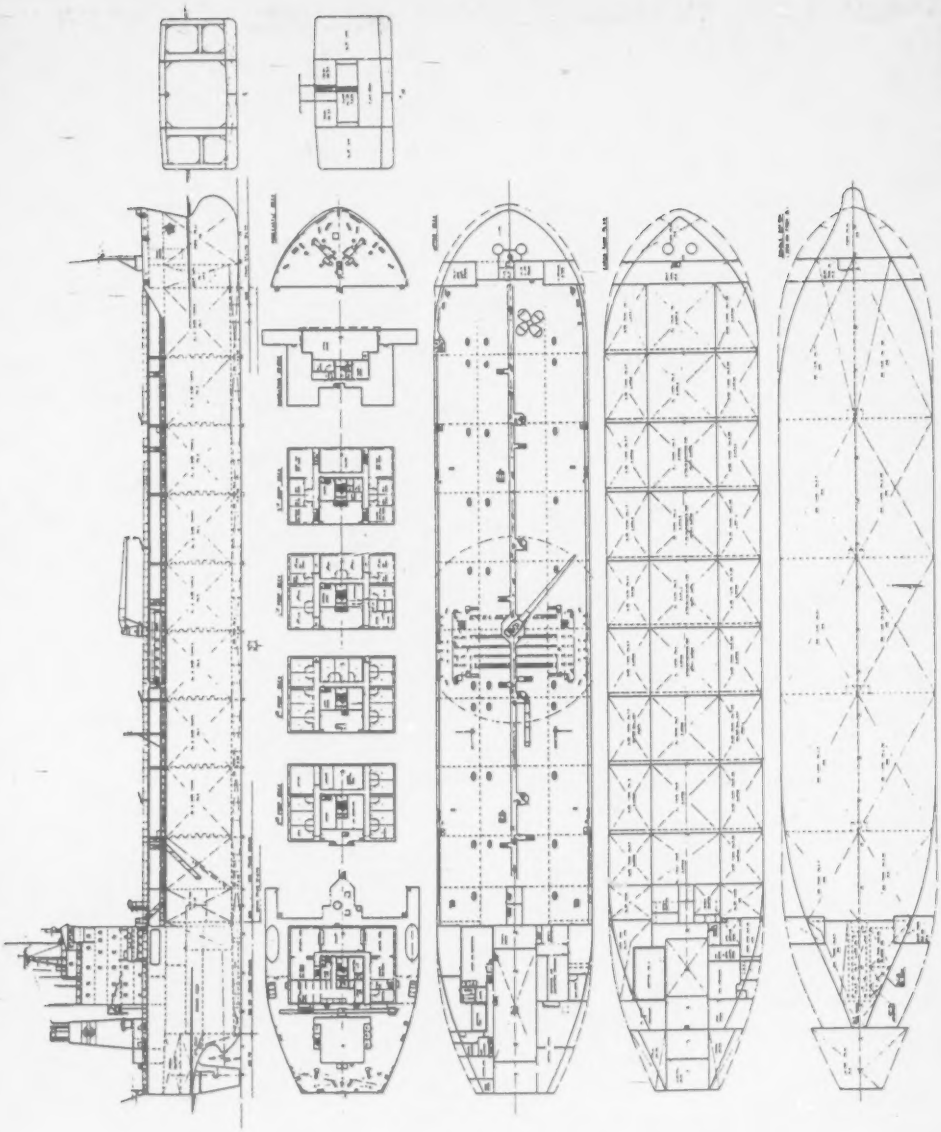
CARGO CONTROL ROOM

- remote control of valves in cargo tanks and main valves in pump room
- remote control of cargo pumps
- remote indication of level gauges and temperatures
- remote control of ballast pumps and valves

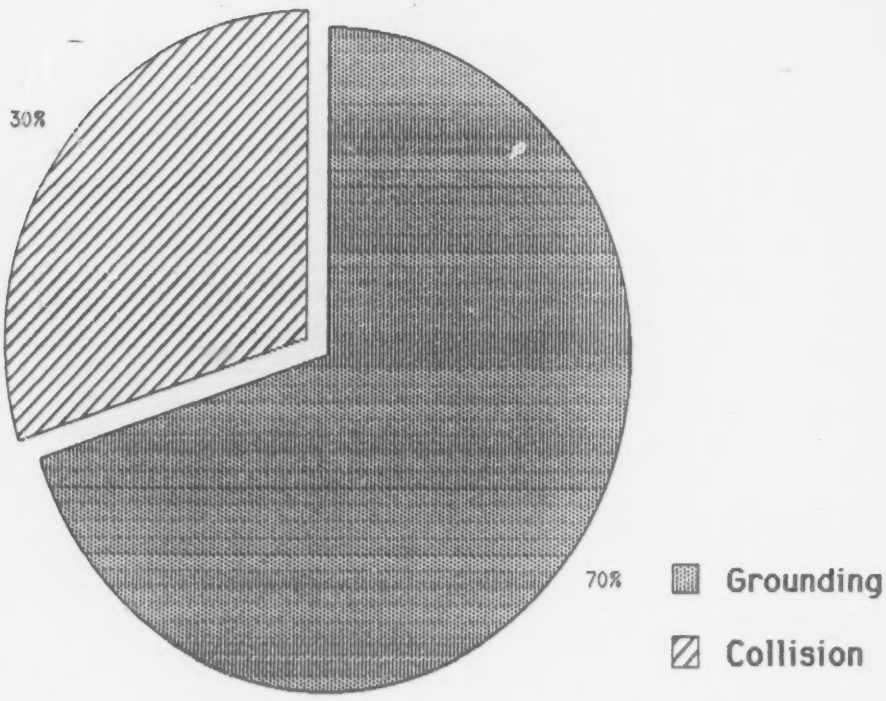
TANK CLEANING EQUIPMENT

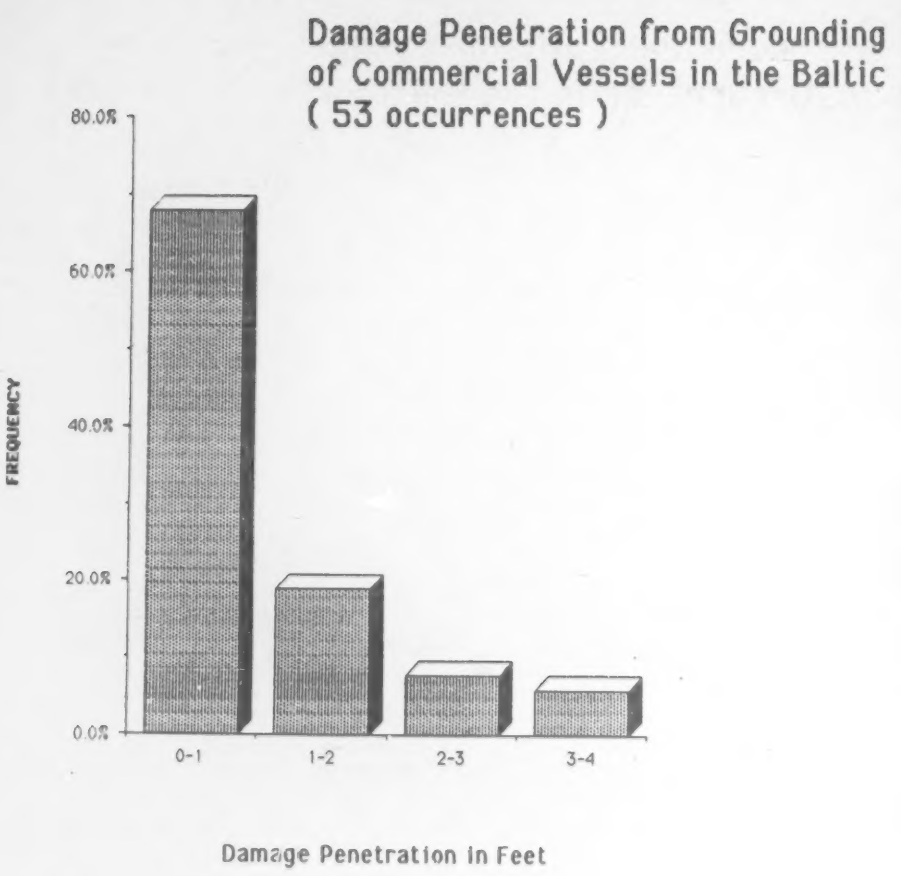
- one el.driven centrifugal pump. capacity 180 m^3 / h – 10 bar
- one steam heater for sea wash water, capacity 180 m^3 / h from +5°C to 65°C
- fixed washing machines for center tank, portable for side tanks (Owner' s delivery)
- oily wash water filter, capacity 25 m^3 / h with transfer pump, content meter and alarm

Four portalbe pneumatically driven fans, capacity 6500 m^3 air. One inert gas plant, capacity 6000 m^3 / h

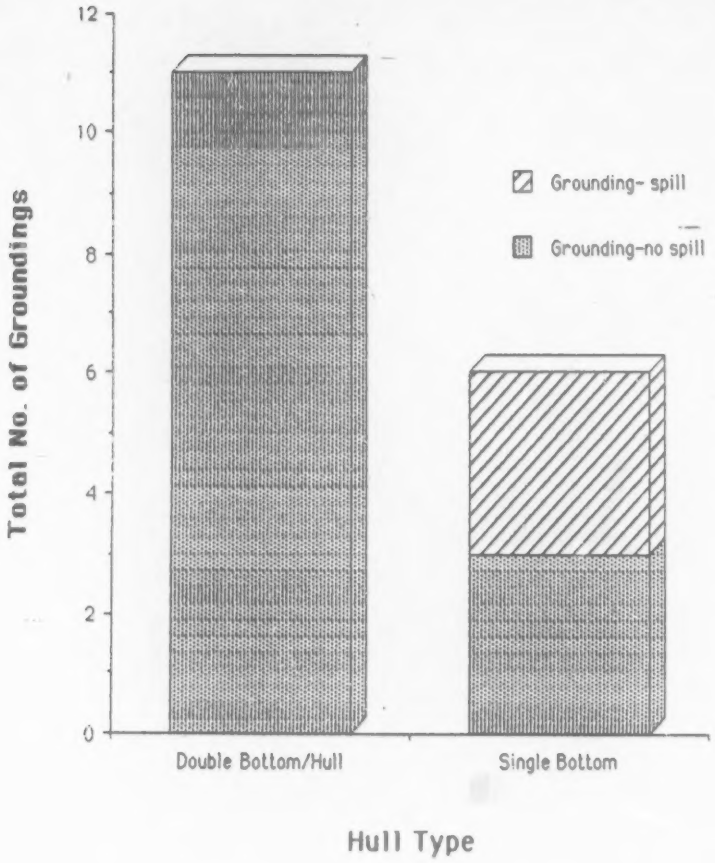


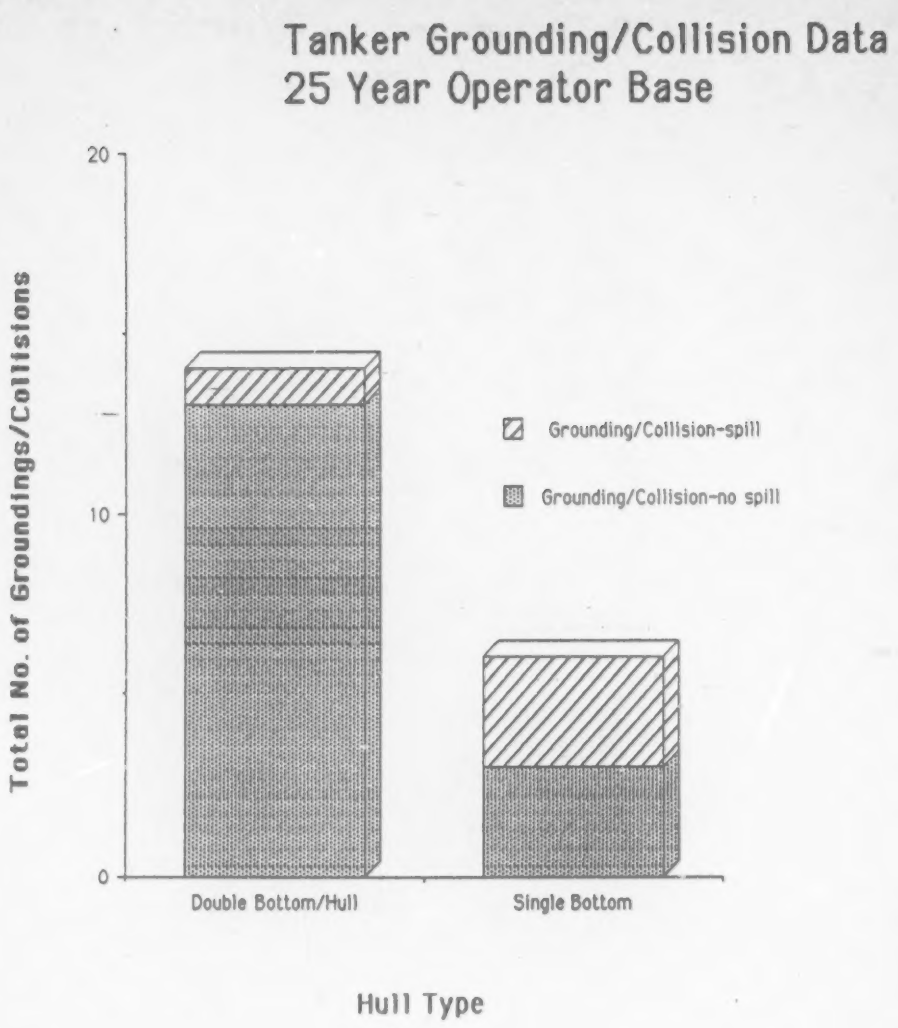
Grounding/Collision Frequency of Occurrence in the Baltic

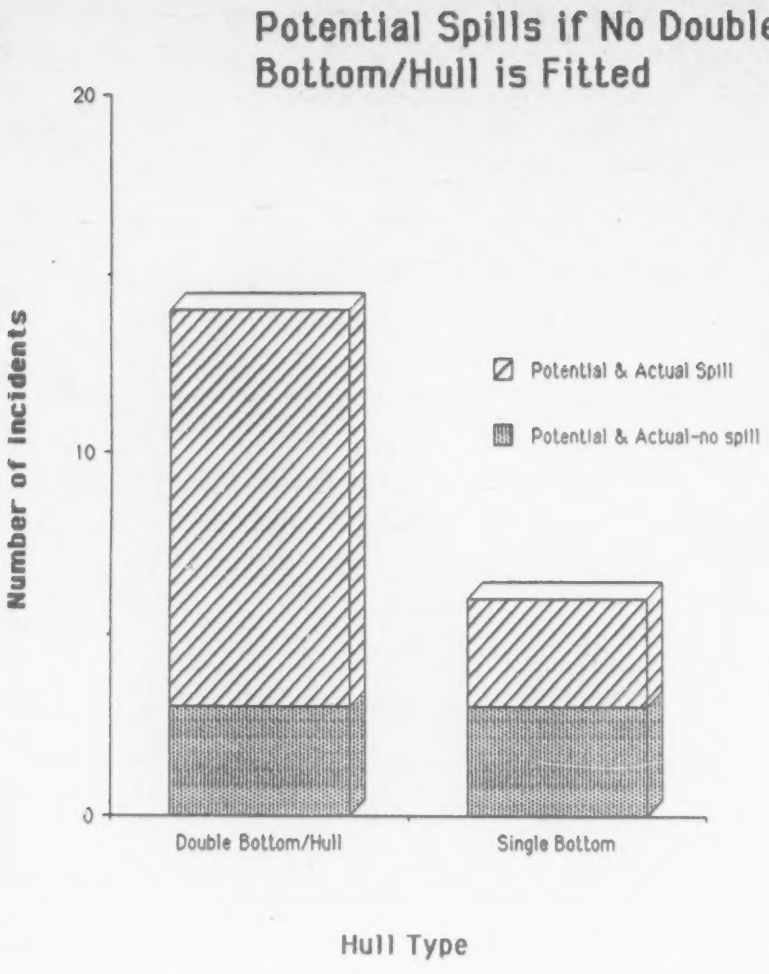



Damage Penetration from Grounding
of Commercial Vessels in the Baltic
(53 occurrences)
80.0%
60.0%
40.0%
20.0%
0.0%
FREQUENCY
0-1
1-2
2-3
3-4
Damage Penetration in Feet

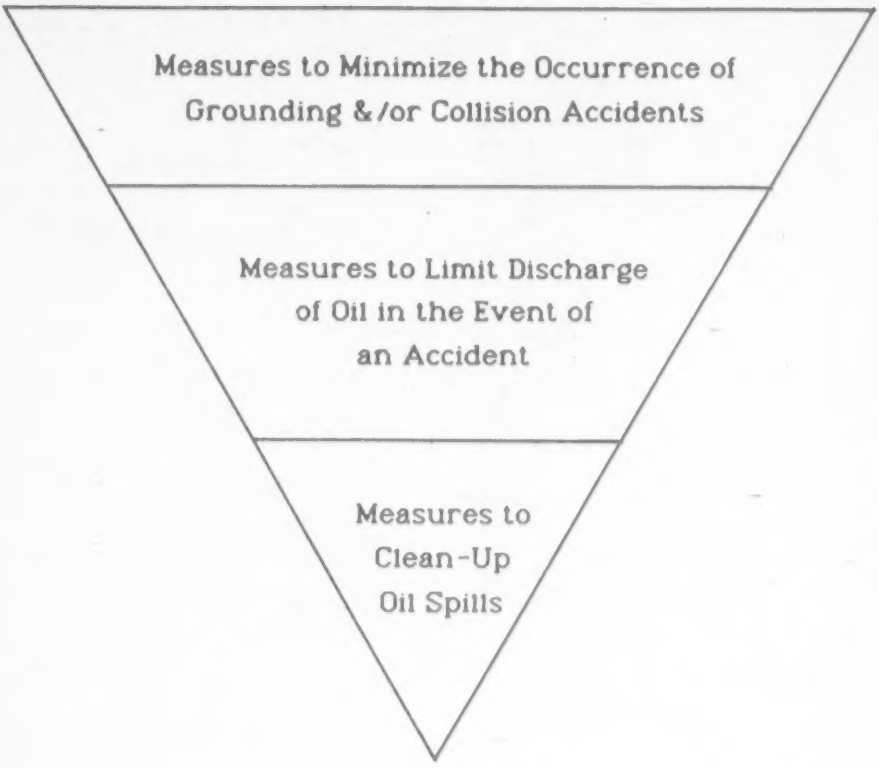
Tanker Grounding Data
25 Year Operator Base




Tanker Grounding/Collision Data
25 Year Operator Base
Total No. of Groundings/Collisions
20
10
0
Grounding/Collision-spill
Grounding/Collision-no spill
Double Bottom/Hull
Single Bottom
Hull Type


Potential Spills if No Double Bottom/Hull is Fitted
20
10
0
Number of Incidents
Potential & Actual Spill
Potential & Actual-no spill
Double Bottom/Hull
Single Bottom
Hull Type

SAFE TRANSPORT OF OIL BY SEA


Measures to Minimize the Occurrence of Grounding &/or Collision Accidents
Measures to Limit Discharge of Oil in the Event of an Accident
Measures to Clean-Up Oil Spills

MEASURES TO MINIMIZE OCCURRENCE OF GROUNDING AND/OR COLLISION DAMAGE

- Enhanced officer, crew and pilot training
- Improved navigation equipment
- Improved maneuvering systems
- Standardized maneuvering information
- V.T.M. Systems
- Operational restrictions
- Escort vessels

MEASURES TO LIMIT DISCHARGE OF OIL IN THE EVENT OF AN ACCIDENT

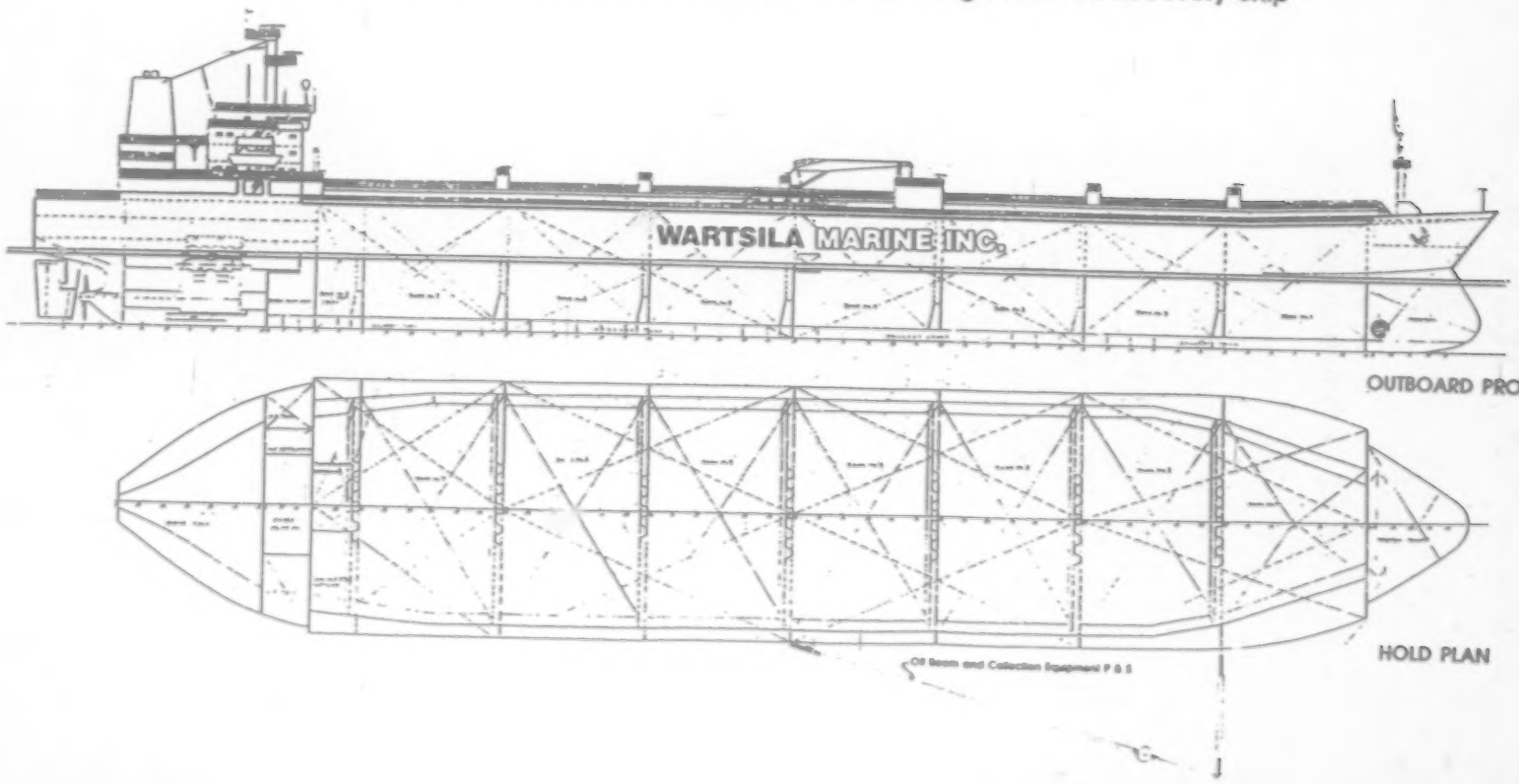
- Double bottom/Double hull
- Vacuum systems/E.C.T.S.
- Outer bottom markings
- Inert gas pressure boost system
- Hydrostatic balancing
- Onboard booms and skimmers

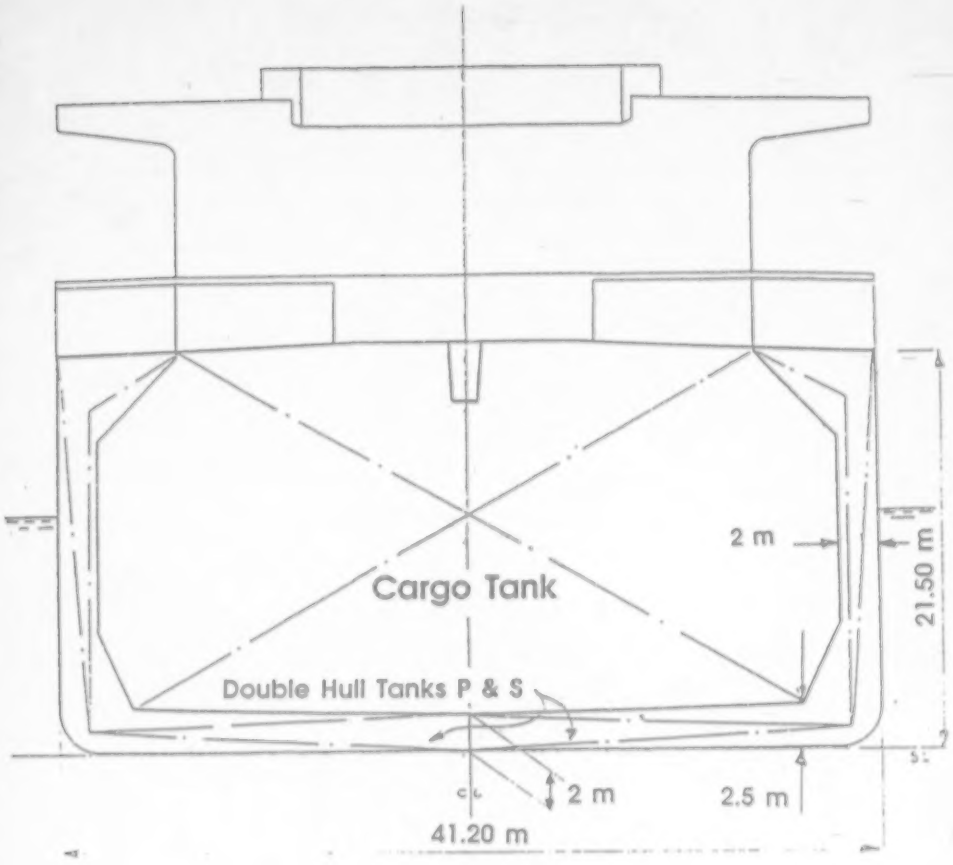
MEASURES TO CLEAN UP OIL SPILLS RESULTING FROM GROUNDINGS AND/OR COLLISIONS

- **Oil recovery, trailing hopper dredger**
- **Oil recovery vessel/navigation aids tender**
- **Shuttle tanker proposal**
- **W.L.B. Proposal**

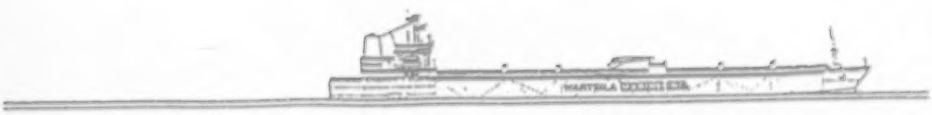
WARTSILA MARINE GREEN MACHINE

80,000 Ton DWT Double-Hulled Shuttle Tanker and High Seas Oil Recovery Ship





SECTION THROUGH CARGO TANKS

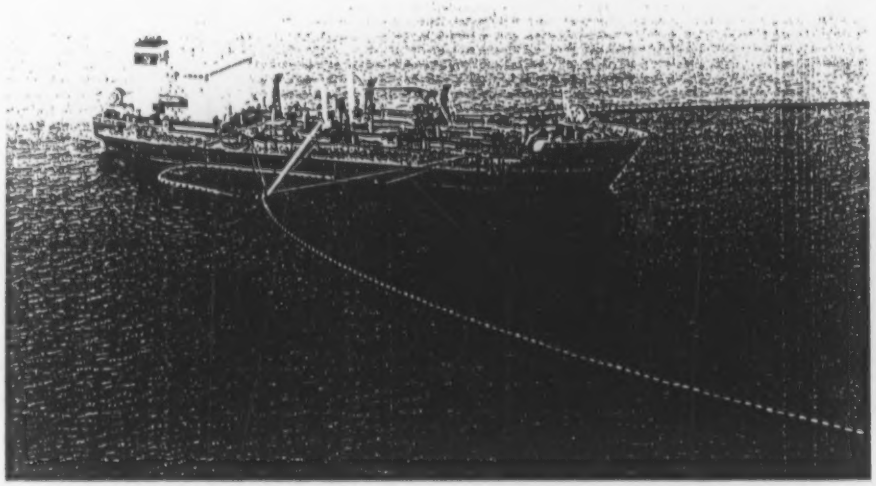


COMPARISON OF TANKER DIMENSIONS

ITEM	CHEVRON G.O.M. SHUTTLE TANKERS	WARTSILA "GREEN MACHINE" TANKER
Length O.A.	239.33 m	242.50 m
Length B.P.	231.56 m	230.70 m
Breadth	37.20 m	41.20 m
Depth	17.48 m	21.50 m
Draft	10.98 m	12.20 m
Deadweight	67,700 tonnes	79,000 tonnes
Speed	14.5 knots	14.5 knots
Power	8,985 kW	8,800 kW
Pumping Capacity	8,743 tonnes/hr	6,750 tonnes/hr
Double Bottom	No	Yes
Double Sides	Yes	Yes

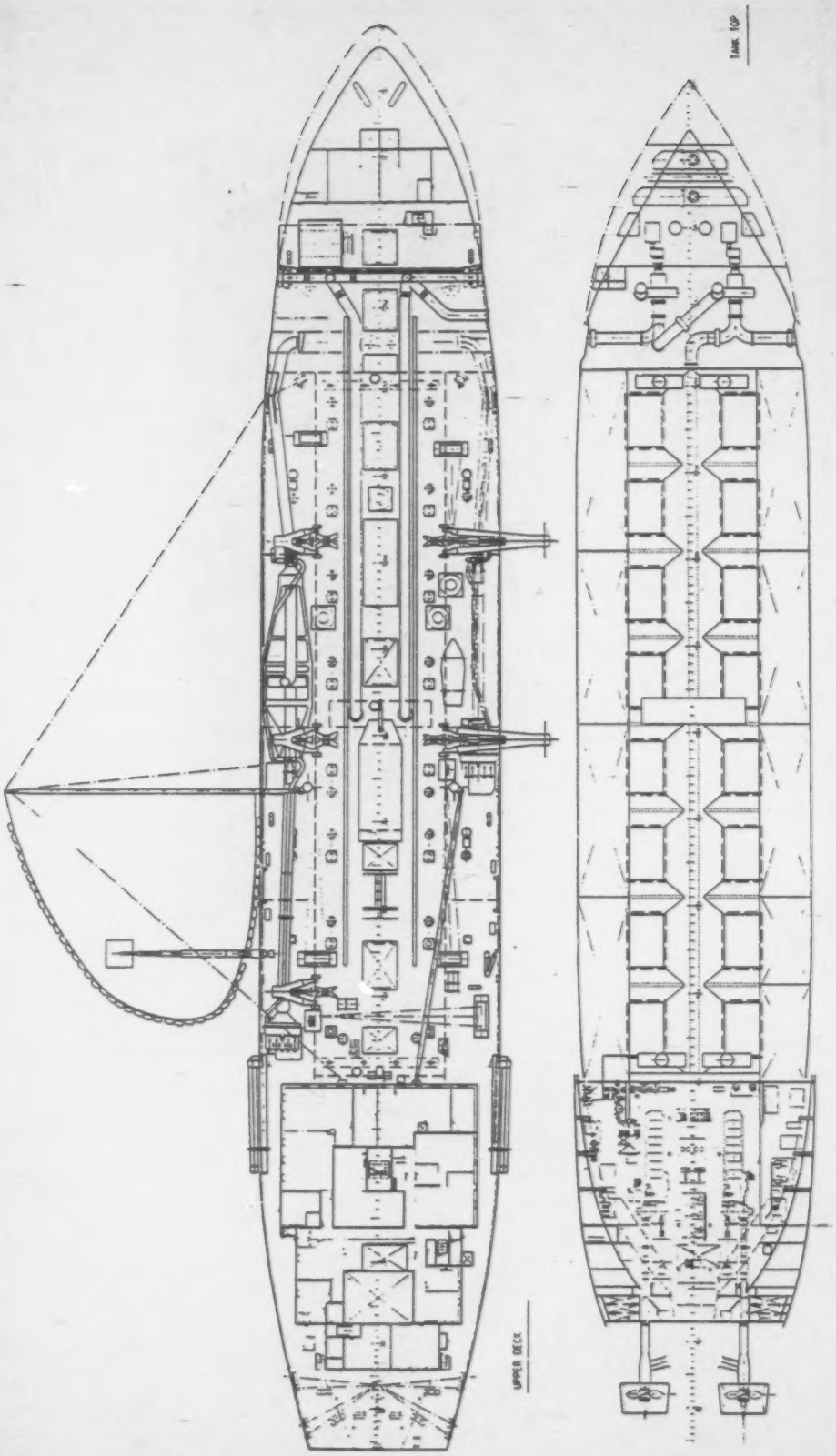
WARTSILA MARINE INC. Vancouver, B. C.

VAYDAGHUBSKY

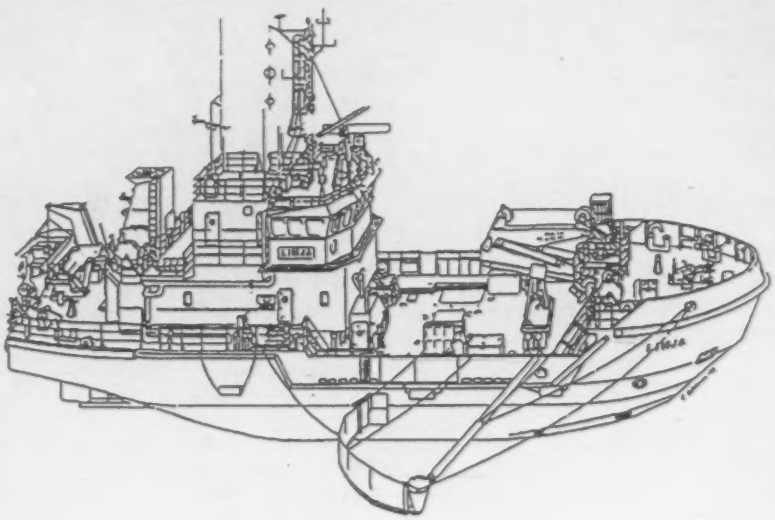


OIL RECOVERY/TRAILING HOPPER DREDGER

Length	132.0 m		
Breadth	22.0 m	Dredge pump capacity	2 x 13,000 m^3/hr
Draught	8.5 m	Max. dredging depth	2 x 30 m/ x 50 m
Gross tonnage	9816	Oil cargo capacity	10500 m^3
Deadweight	12,000	Oil Sweep width	60 m / 250 m
Main Diesel Power	2 x 4,400 kw	Firegifhting monitors	2 x 1,200 m^3/hr


UPPER DECK
TANK TOP

WARTSILA MARINE INC.
Vancouver, B. C.



Length overall	34.9 m
Breadth	9.0 m
Height	3.4 m
Draught	2.5 m
Main Engine Power	2 x 460 kw
Speed	11.5 knots
Crew	4 + 8 persons
Cargo tank capacity	75 m^3

Classification: Lloyd's Register of Shipping, 100A1, "Ice Class 1a", Oil Recovery ship, Northern Baltic Service, +LMC, UMS.

"LINJA" OIL RECOVERY AND NAVIGATION AID VESSEL

GENERAL DESCRIPTION

The vessel is intended for oil recovery and navigation service work in coastal areas of Finland. The vessel was delivered by Wärtsilä Marine to the Finnish Government in November 1988.

Oil recovery:

- the vessel can perform oil recovery in seas 1 m high and in winds of up to 10 m/s. The speed of the vessel during oil recovery is 0.5 - 2 knots. Maximum recovery capacity in optimal conditions is 70 tonnes/hour.

- The oil recovery equipment is developed by Wärtsilä Marine and is designed for heavy oil recovery. With a skimmer light oil recovery is also possible.

- the oil recovered may be stored onboard and transported by the vessel

- the vessel may be utilized in oil discharge duties

- the vessel may be utilized for water and fuel supply and for power supply (electricity, pressurized air, hydraulics) as well as for passenger transportation and accomodation

- the vessel may transport oil recovery containers and equipment on deck with a weight of max. 16 t.

Navigation aid work:

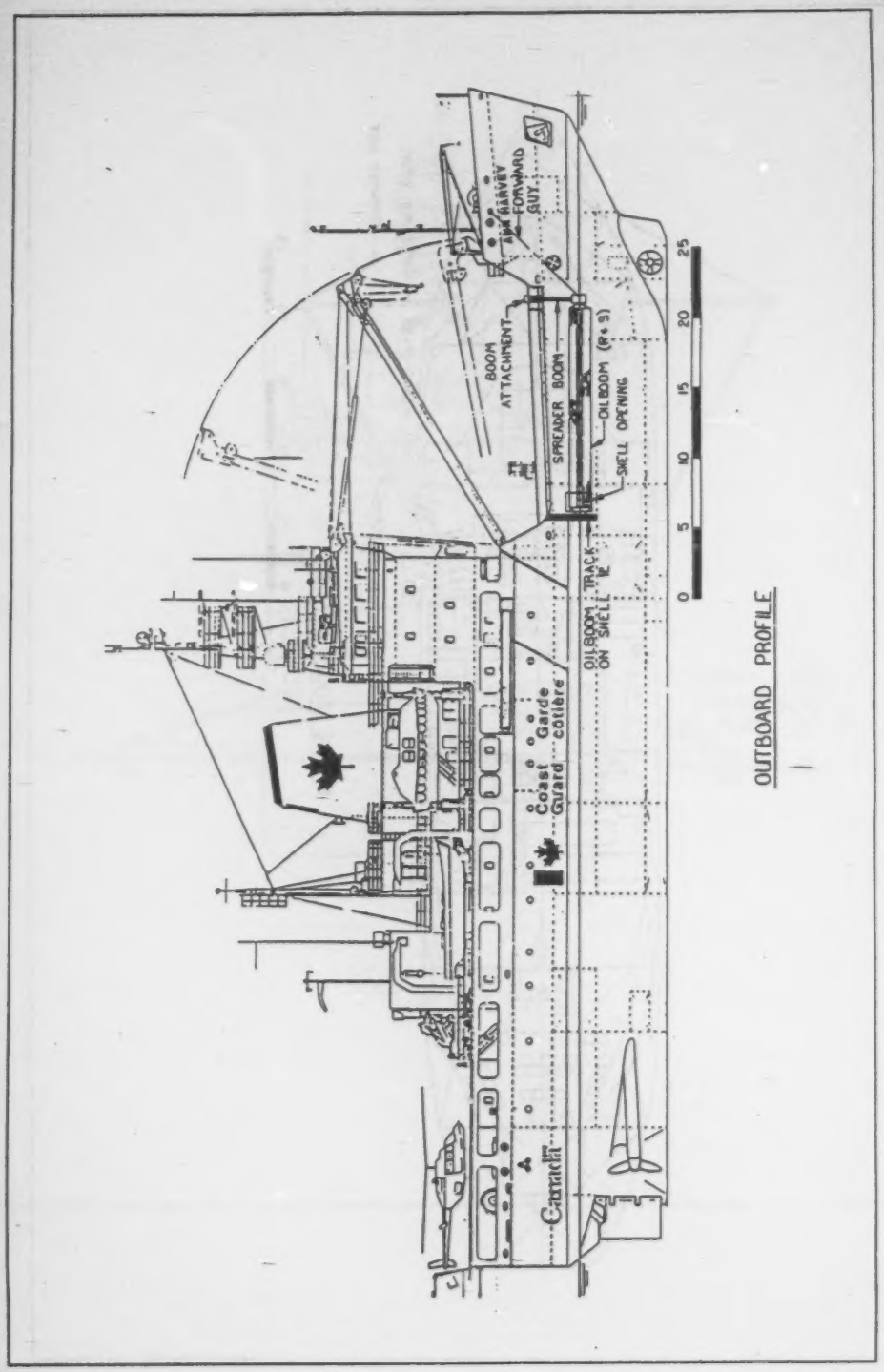
- the crane has a maximum capacity of 10 tonnes/6 m range. The maximum range is 18 m with smaller load.

- buoys and marks may be serviced on deck under soft cover.

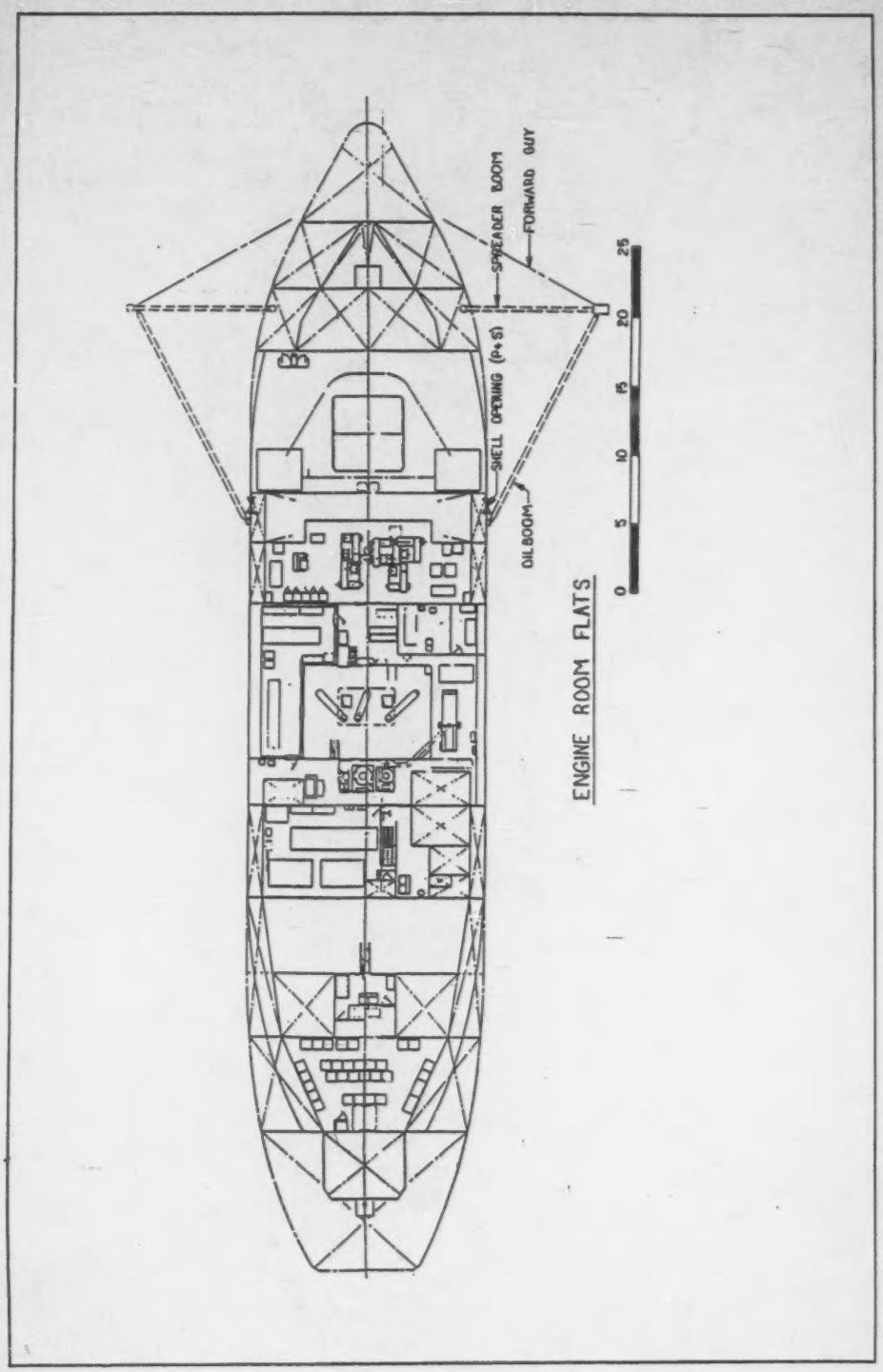
Other duties:

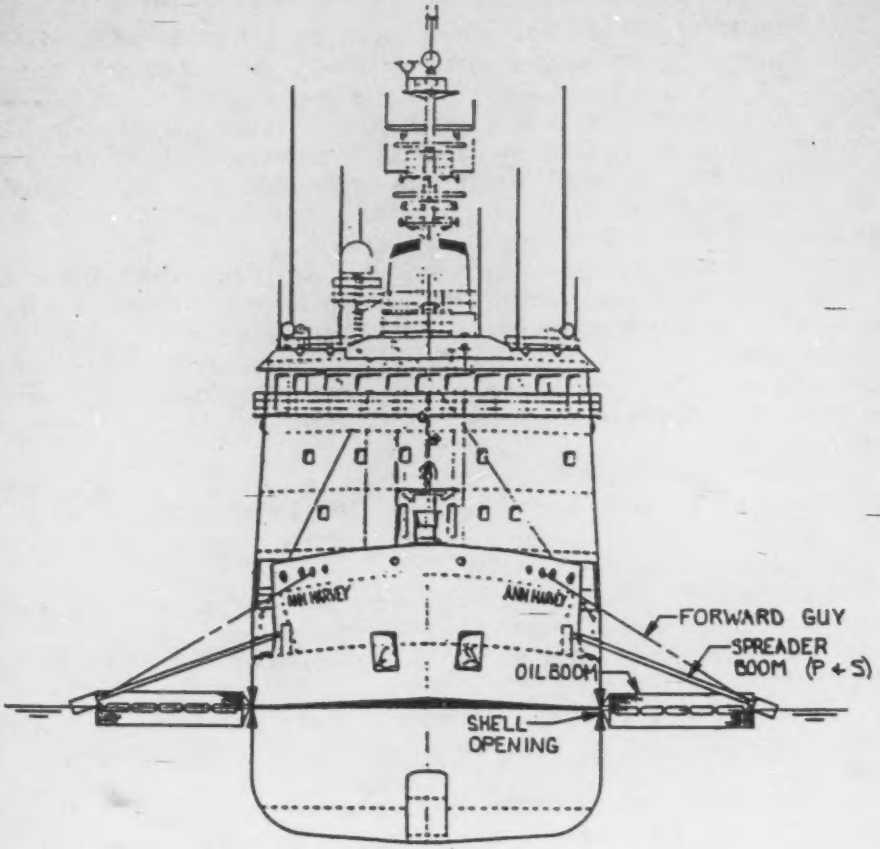
- the vessel may transport wheel vehicles with a maximum weight of 16 tonnes on deck (axle load max. 10 t.).

- the vessel may operate on broaken channels in the Baltic. The maximum icebreaking capability is 0,3 meters.



OUTBOARD PROFILE


SPREADER BOOM
FORWARD GUY
SHELL OPENING (P+S)
OILBOOM
0
5
10
15
20
25
ENGINE ROOM FLATS


ANN HARVEY
ANN HARVEY
FORWARD GUY
SPREADER BOOM (P + S)
OIL BOOM
SHELL OPENING

BOW VIEW

Mr. TORRICELLI. Thank you very much, Mr. Noble.
Mr. Bergeson?

STATEMENT OF MR. LLOYD BERGESON, NAVAL ARCHITECT AND DESIGNER, LIQUEFIED NATURAL GAS TANKERS

Mr. BERGESON. Thank you, Mr. Chairman. I'll try to be brief.

My principle concern, of course, for many years has been the environment. Twenty years ago exactly, I was engineered for—I was in charge of developing a new product at Quincy Shipyard in Massachusetts and we looked at LNG as a market that we could exploit, but it was the most dangerous cargo that you could think of from many points of view, much more seriously catastrophic than the immediacy of an accident on oil tankers.

So we searched for that which would give the greatest protection to that dangerous cargo from the effects of groundings and collisions. After many months of research and experiment we decided that we would provide a double hull and spherical containment. It was using a proprietary Norwegian system for smaller ships which we developed. We provided, as I said, double hulls and spherical containment.

Ten years later, in 1980, one of these ships, the LNG Taurus, went aground in very heavy weather off Tobato, Japan, so hard that she destroyed 40 percent of her bottom plating. In fact, the captain committed suicide.

Several of the ballast tanks were—by the way if anybody wants to see it, there is a picture of the LNG Taurus.

Mr. TORRICELLI. Is this a product of one of the ships in the Quincy yard?

Mr. BERGESON. Yes. There were 10 of them that have been built.

Mr. TORRICELLI. Had they been sold to the Japanese at that time?

Mr. BERGESON. No, it's owned by Burma Oil Company.

Mr. TORRICELLI. Burma Oil, but it had a Japanese captain?

Mr. BERGESON. It had an American captain.

Mr. TORRICELLI. Oh. I was making an assumption.

Mr. BERGESON. In any event, the inner hull had a— people have been stress-concerned about the ship's structures and depths being too weak to take the air pressure to salvage these things, but it was salvaged by pumping up the inner hull, here, with air. It has a very strong water-tight flat here.

Mr. TORRICELLI. So in fact you used the double hull so it would advantage in salvaging?

Mr. BERGESON. Yes. Pending the salvage, contrary to what many people say, you want the ship—a good salvage master that—and he will tell you that you want the ship firmly aground. So the ship was deliberately put firmly aground by flooding its ballast tanks until they could get ready to salvage it. So there are many misconceptions.

That's the important thing, so it's all nonsense to say that there are questions about safety with double hulls, in my opinion.

I want to give you a historical note. In 1858, the great engineer, Brunel, designed a double hulled ship. Here and here and here are longitudinal stringers on the deck which is the flange of the ship

girder is the same, an immensely strong ship. In 1858. What did it do on a voyage to America a couple of years later? It went aground on an uncharted rock, drifted 80 feet, and its hull by nine feet, that one particular cell filled up with water. A coller dam was put around it, it was repaired—there were no docks to take it in the U.S. I think I have some more of those.

I want to say this, too, on the cost of double hulled ships. We found in 1972 that the double hulled ship was infinitely simpler to manufacture because you can make panels, stiffened panels on fully automated lines, withholding panel lines, and you could slap her together into units, assemble those units, erect them, and you can actually build a double hulled ship, in my opinion, if you production engineer it for manufacture, very much cheaper than a single hulled ship.

I brought somewhere a picture of a single hull—I don't know whether—I don't have it here—but a single hull is a massive structure and its damned hard to build.

Okay. So, these things are—given the chance, American engineers can design double hulled ships. It's nonsense to say that there isn't any capacity. These things can be built anywhere. These assemblies can be built out in Iowa. These things can be built anywhere, shipped by rail—

Mr. TORRICELLI. Mr. Bergeson, you say that it's potentially simpler and cheaper, is that because the double hull is structurally able to assume more?

Mr. BERGESON. One of the reasons is that just the configuration makes it easier to manufacturer. The other is that the double hull as a structure, as a beam, as a girder is much stronger.

Mr. TORRICELLI. Right.

Mr. BERGESON. So you can reduce the weight of those steel—

Mr. TORRICELLI. That was my question.

Mr. BERGESON.—in the structure—

Mr. TORRICELLI. That's what I was assuming.

Mr. BERGESON.—substantially, by as much as 30 percent and have it just as strong as—so you can save money. It costs money to—you don't want to save the weight indiscriminately because since 1966 when the classification societies were given charge of the scantlings of ships and since finite element analysis came around, why designers, clever designers have taken the weight out of the ships.

They've done too much of that all around the world. The ABS has been the most conservative, I must say. So some of these ships, when they hit the mud even, the bow breaks off. So attention has to be given on double hulled ships or single hulled ships to scientifically—and that's where you can be scientific—putting back into the structure of the ship to help mitigate the effects of groundings and collisions, putting that weight that's available back into the right place. I'm sure that ABS is going to work on it, at least I've recommended to them that they work on it. I happen to be a member of that society.

This is pretty—next off—I hope you get the point.

Mr. TORRICELLI. Actually, this has been very helpful, Mr. Bergeson.

Mr. BERGESON. Here's a report from the London Salvage Association. Vessel traveling over 20—I'll just read a couple of lines—"vessel traveling over 20 knots grounded when almost one third of its length was above water"— spraying out of water. I don't know what kind of a ship it was, but it had a double bottom. The fact that the vessel was designed with double bottoms prevented the cargo holds from being penetrated, and consequently made the salvor's task much easier in that they were able by the use of compressed air in the double bottom tank, to lighten the vessel thus altering the angle of the grounded vessel.

So it's nonsense to say that you can't salvage these. You couldn't do that with a single hull. You couldn't have salvaged the LNG Taurus if you had had a single hull. Of course the Exxon Valdez didn't have one. The reason was that Exxon depended upon overinflated estimates that would cost that ship—made in—of double hulled ships made in—the estimates made in Japan. The Japanese had never built double hulled ships so they put a margin of safety into it. They put them way up high, 20 percent increment for double hulled ships.

Mr. TORRICELLI. Is that the figure on the Valdez hull that if originally built that a double hull would have been 20 percent more than that?

Mr. BERGESON. No. There is a very impressive study, interagency government industry study, made in 1972 to get ready for an international convention—what do you call it, convention—on tanker safety in 1973. As a result of it, three people, Peter Kimon, the Chief of Research of Exxon, Ronald Kiss, who is now the director of shipbuilding for the Department of the Navy; and Joseph D. Porricelli—you must know him—who is a Naval Architect in Annapolis, Maryland, made a report of this to the society of Naval Architects of— double hulled were the way to go if you want safety. Double bottoms are less good, but they're the way to go. The costs in that report were overinflated.

Now, you just don't take—nobody in their right mind is going to take some marketing department's—Japanese marketing department's estimates—other than with a grain of salt. So estimates should have been made. At the time I and others were making estimates of double hulls because we were convinced they were coming and it was coming out that the double hull is no more than the cost of a single hull with segregated ballast, which, of course, became the law in 1978.

Now, macroeconomics of oil spills—for God's sake, suppose the Valdez had had 10 percent add-on for double hull. All right, that would have been $12 million. What are they— what's the bill they're paying now? It's up to $3 billion I read in the papers. Maybe it's only $2 billion. What's their coverage from insurance syndicates for T and I. $750 million, maybe. Maybe it was only $500 million. For heaven's sakes, $12 million for a double hull, even if the ship only has one grounding in its life, is the cheapest insurance you could possibly have.

But you see the cost of the $3 billion doesn't pay for the environmental damage. You can never replace that environment. So we shouldn't even be talking about the cost of ships to even—and it

was very encouraging to have the Vice President of Conoco say that.

Mr. TORRICELLI. It was indeed.

Mr. BERGESON. It certainly was.

Now, retrofitted devices—they're good ones. One is the SCOL system, one is the light-loading system by Mr. George Blake, and possibly some of yours—I don't know. The so- called National Academy of Science's Committee should really consider these. And then somewhere in the legislation there should be the provision for retrofitting ships with the best of them. Maybe one or the other, whatever the two best are.

Mr. TORRICELLI. Mr. Bergeson, do you believe that it is possible to retrofit with steel double hulls, or with bladder systems?

Mr. BERGESON. Not bladders, not steel, but if you will — I can—there is the so-called SCOL system, a system for control with oil leakage, limiting damage—cargo loss and this paper on it—by the man who invented it, Mr. Edward Tornay, I think it maybe ought to be part of your proceedings.

Mr. TORRICELLI. Well, actually, why don't we do this? When we return for questions maybe there are a couple of these retrofit systems we could describe a little bit in detail.

Mr. BERGESON. Sure.

Mr. TORRICELLI. Mr. Keith—

Mr. BERGESON. There is the light-loading system.

Mr. TORRICELLI. Does that conclude your testimony, Mr. Bergeson so we can—

Mr. BERGESON. No.

Mr. TORRICELLI.—complete the panel?

Mr. BERGESON. I'd like to just mention that—well, if you want to, I can cover it in questions. I have some information on the underwriter's views of the London Salvage Association.

Mr. TORRICELLI. Let's do that. Let's come to that during questions because I'd like to—

Mr. BERGESON. I'd like to say this, though, that I am outraged at the American Petroleum Institute. They issued a press release on May 18th, despite the moderate statement of their representative here this morning, Mr. Roland. On May 18th they issued a press release reiterating half truths and absolute falsehoods with respect to the fact on oil spills and double hulls. They referred to the National Academy of Science's Committee and they said—they quoted as a fact that the Committee was financed by the Coast Guard and are using highly sophisticated computerized, analytical techniques to analyze double hulls and to bring some alternative thereto to the floor, consideration of which would of course introduce, I say, further delay into the adoption of double hulls. But what they say is just hype. I called the Chairman of the Committee, I asked him are they using these Committee techniques, and he said no, and that he wished they had not put that thing out.

So don't put too much dependence into a mere Committee. A Committee cannot conduct research. This is a volunteer Committee, and it's understaffed, and it is underfinanced to do what these people with a straight face say they are depending on it to do. It can't possibly to do that.

[The prepared statement of Mr. Bergeson follows:]

Testimony of
LLOYD BERGESON
before the Committee on Science, Space & Technology
of the U.S. House of Representatives
Washington, DC

Hearing on Oil Transportation Safety

May 24, 1990

I appear before you because of my concern over many years as to the exponentially increasing decay of our world's oceanic environment and the need to drastically decellerate that trend. Incidentally, all views expressed by me are my own except as otherwise noted.

Oil spills have been an important element of that decay. They can be drastically reduced if Congress promptly and resolutely mandates:

- "plain vanilla' double hulls for all new construction effective with the signing of the legislation.

and

- the phase-out of existing single hull oil tankers in a reasonably short time period - along with a proviso to retrofit those tankers which trade to the U.S. with suitable oil spill mitigation devices or procedures.

Acceptable devices or systems should be as indentified by the National Academy of sciences Committee on completion of their study later this year.

I do not say that today's double hull designs cannot be improved and optimized insofar as their ability to absorb the impact of collisions and groundings without penetration of the inner hull and with respect to their salvagability. They can be but that improvement program should be a shared responsibility between the classification societies (ours is American Bureau of Shipping or ABS), the Coast Guard, the Society of Naval Architects and its members, and the shipowners and their technical staff. The ABS since its formation has had as its mission the safety of life and property at sea. I am a member of that society and know from long association that they consider that their rules also reflect a strong commitment to environmental protection. They should, I believe, publish guidelines for double hull ships which are optimized for the maximum practicable impact resistance against both groundings and collisions. The Coast Guard should place equal emphasis on the protection of the environment from the results of groundings and collisions to that now given the safety of life and property at sea. The Society of Naval Architects and its members should add 'safety of the environment' to their professional credo for the design of ships and members should have that credo on their walls as they go about their business. Owners and oil companies should follow the lead of CONOCO and a few other shipowners worldwide who include <u>environmental</u> protection in their corporate credo. The quoted words of Mr. Constantine S. Nicandros are particulary pertinent:

> "We are in business by public consent. We are sincere in our concern for the air, water and land of our planet as a matter of enlightened self-interest".

The above statements are the essence of what I want to express to you today. I hope the rest of my testimony will also prove useful and I will try to summarize the balance of it as concisely as possible.

By way of background, I am a graduate Naval Architect and Marine Engineer, M.I.T., Class of 1938. Most of my career has been spent in managing the development, engineering, design and construction of major naval and commercial ships - some twenty different classes in all. These include such diverse types as WWII cruisers and fleet submarines, nuclear attack and nuclear POLARIS missile submarines, oil tankers, submarine tenders, other naval auxiliary ships of various types, cargo liners, container ships, crude oil tankers, product tankers, barge carrying ships (Lykes SEA BEES) and liquified natural gas carriers (LNGs). In recent years, I have concentrated on demonstrating to the marine community that wind power is practical and profitable to augment conventional screw propulsion as a means of conserving oil and reducing CO_2 emissions to the atmosphere.

Many of the ship types mentioned above had double bottoms. The WWII submarines had a pressure hull surrounded by ballast tanks. The LNG ships I refer to, in addition to the double hulls, had five separate spherical cargo tanks per ship, each of 25000 cubic meter capacity as well as extensive internal ballast tanks for the maintenance of constant draft. See Figures 1 & 2.

The first truly double hull ship on record was the 692 foot, 27,380 ton GREAT EASTERN launched in 1858. This mammoth ship for her time was designed by the great engineer, Isambard Brunel. Her hull was immensely strong; its double skin being attached to water tight longitudinals as shown in Figure 1. Early in her career, she hit an uncharted rock off Long Island ripping a hole 9' X 80' in her flat bottom. The ingress of water was confined by the W.T. longitudinals and a major disaster was averted. She was repaired in the water using a caisson. See Figure 4.

Over the ensuing 140 years, double bottom and double hull ships have on many occasions done their job as planned by preventing the loss of vessels and mitigating or preventing loss of cargo and or damage thereto in the event of a grounding and collision. They have gotten no publicity because they did not create disasters as in the case of EXXON VALDEZ.

Such an unheralded incident was the grounding of LNG TAURUS off Tobata, Japan in 1980. This 924' ship with a displacement of 91,200 long tons hit rocks in heavy weather while approaching port. She struck so hard that 40 percent of her bottom plating was badly damaged and three ballast tanks were partially flooded. The vessel was easily controlled or 'pinned down' pending salvage by flooding ballast tanks. After three days, the ruptured tanks and inner hull was pressurized with air. The ship was refloated on a high tide and taken to the nearby terminal where the cargo was discharged. She then proceeded under her own power to the repair yard. No difficulty in assuring a positive GM (adequate stability) was encountered due to the presence of damage water despite the high center of gravity of the cargo tank. The double hull had done its job as deliberately planned.

I emphasize 'deliberately planned' because in 1970, as General Manager Quincy Shipyard of General Dynamics, I was searching for a potential

FIGURE 1

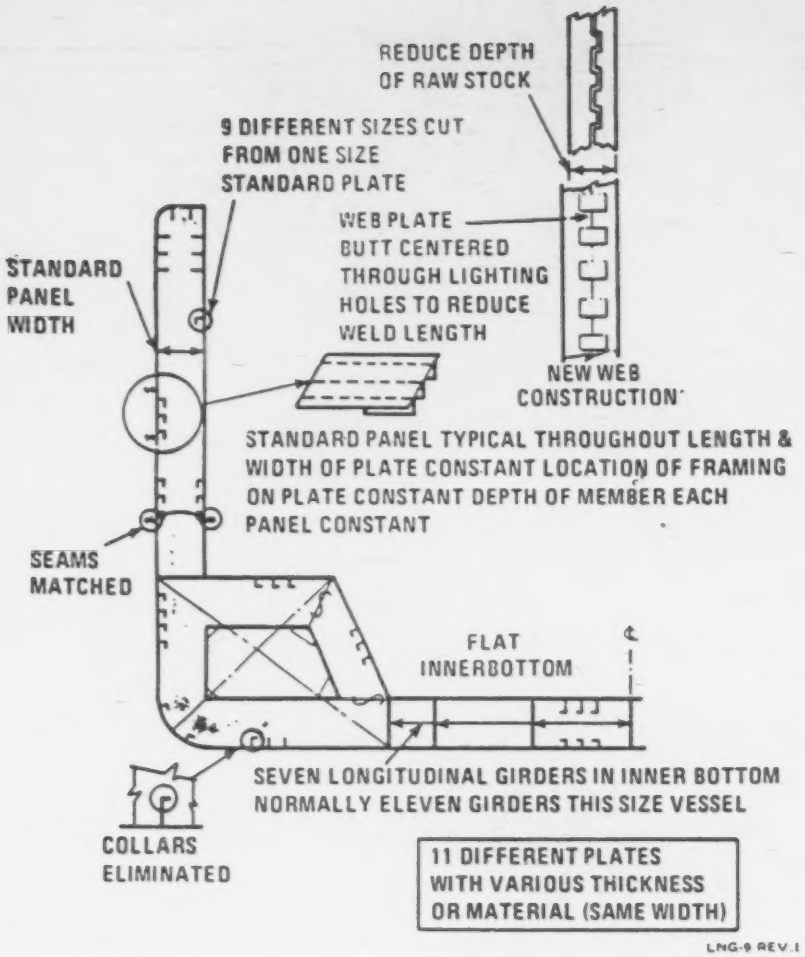


FIGURE 2-1. 125, 000M^3 LNG SHIP - STYLIZED MIDSHIP SECTION

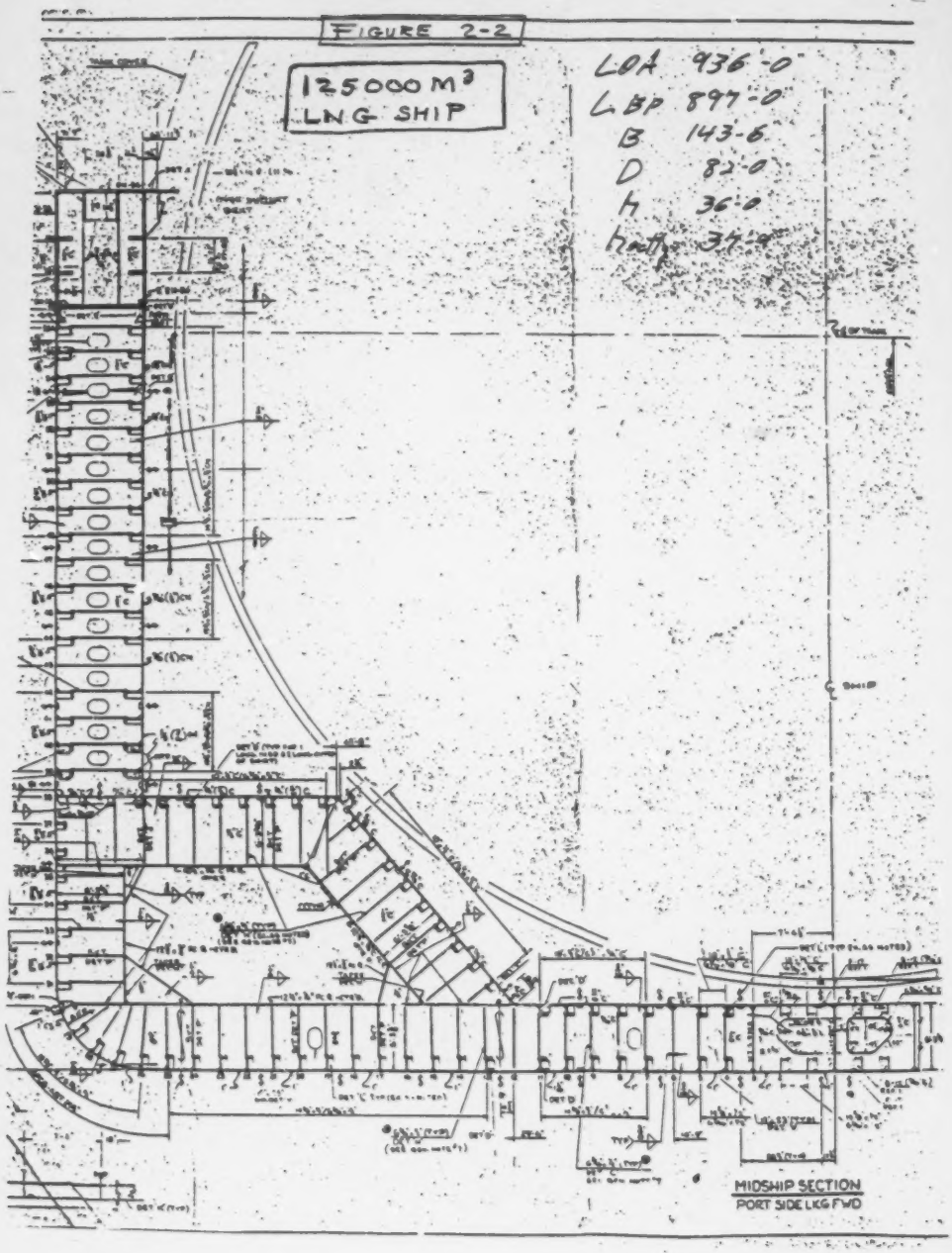


FIGURE 2-2
125000 M³
LNG SHIP
LOA 936'-0"
LBP 897'-0"
B 143'-6"
D 82'-0"
h 36'-0"
MIDSHIP SECTION
PORT SIDE LKG FWD

proprietary product with which to revive the yard from its moribund state. 125,000 cubic meter LNG ships represented that opportunity if we could convince ourselves that we could provide real protection for extremely hazardous cargo while in transit and most particularly in the event of groundings or collisions. After months of study of alternatives the Kavaerner Moss (Norwegian) spherical tank system and ships configuration as conceived for smaller ships appeared to offer the greatest potential towards this end. We obtained a license and developed the concept for the larger 125,000 cubic meter ships - marketing them only after concluding experimentally that the configuration including the spherical containment did meet our safety criteria.[1] The LNG TAURUS and her nine sister ships resulted.

The following London Salvage Association report on a recent grounding is quoted in full:

"KOWLOON BAY'
GROUNDED RONDO ISLAND - 24.11.89

FACT "Vessel travelling over 20 knots grounded when almost one third of its length was above water line. As a result the lower section of ships stem including bulbous bow/fore peak tank, No. 1 deep tank, the lower section of the bow thruster space and No. 2 double bottom tanks port and starboard were either destroyed or severely damaged. There was no leakage of water into any of the cargo hold spaces.

However due to the design part of the double bottom i.e. No. 2 starboard and port tanks were used for fuel oil and this escaped into the sea but no pollution resulted.

OPINION The fact that the vessel was designed with double bottoms prevented the cargo holds from being penetrated and consequently made the Salvor's task much easier in that they were able by the use of compressed air in the double bottom tanks to lighten the vessel thus altering the angle of the grounded vessel. Furthermore bearing in mind that the combined value of ship and cargo was in the region of million Shipowner's liability to cargo was somewhat lessened.

Lastly once the vessel was salved it proceeded on a long tow to port of refuge and subsequently permanently repaired."

Sadly the EXXON VALDEZ would have had at least a double bottom; if starting in 1973 EXXON had turned their considerable naval architectural talent to the problem of designing optimized double hull ships which would provide the maximum protection to life, property and the environment. Instead, they used overstated estimates of costs for double bottom hulls as the rationale for ignoring their environmental commitments on the Valdez run and successfully maneuvered to scuttle both double bottoms and double hulls over the years 1973-1978 inclusive and until this day.

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[1] Cargo containment structural analysis included:

- Hull finite element
- Hull tank interaction
- Structural stability
- Thermal stress
- Ship motions
- Testing of most stressed joint at cryogenic temperature on the "leak before failure theory".

On the cost of double bottoms and double hulls, there has been much misleading information bandied about. My own experience based on the Quincy LNGs and subsequent cost estimates for double hull ships, is that they should be no more expensive to build than single hull ships. If built to ABS rules for tank depth and double skin width (approximately two meters) they require less steel and fewer man hours to fabricate and assemble if they have been thoroughly engineered for ease of production.

On replacing the fleet, it is common knowledge that nearly 100 ships of the U.S. (Jones Act) fleet, and over 3,000 of the world's fleet of tankers must be replaced or given new midbodies because of age in the next 20 years, even if the fleet size is not expanded. I am convinced that this task can be done far more economically if based on rationalized double hull construction - as opposed to single hulls with segregated ballast tanks. There is also no good reason why an important share of the business cannot be performed in U.S. yards at competitive prices.

Passage of oil spill legislation including double hulls is urgently needed. Since the replacement need is environmentally more than urgent as well as operationally and economically urgent from a shipowners' point of view, Congress should get on with the legislation at hand very promptly. I vastly prefer the House version as now written because it is simple, relatively unequivocable and with an even shorter deadline for phasing out existing, aging single hull tankers than the Senate's. Also, it contains no equivocation on matters of double hulls. If possible, it should be made even more unequivocable and with a shorter deadline. In no case should the Congress and the administration, including the White House, the Department of Transportation, MARAD, or the Coast Guard allow itself to be bullied, beguiled or seduced by the oil industry into submitting the matter to an international body such as IMO before making the requirements the law of the land, and issuing strict regulations relative to the enforcement thereof.

With respect to macro-economics of oil spills, EXXON's out of pocket cost to date is at least $2 billion and there are reports that it may have reached $3 billion. Some of the $3 billion may be covered by T and I or liability insurance - perhaps as much as $750 million. Most responsible estimates of effectiveness of double bottoms including my own, the Coast Guard's and Government/industry studies, indicate that double bottoms would have been more than 50% effective in limiting the spill. EXXON's bill then would have been reduced by at least 50% and the environmental damage in proportion. Another accident of similar proportions is due any day somewhere in the world. Maybe the lesson to be learned from this by all ship owners is that even a modest cost increase in tankers for double hulls is a bargain when viewed as a premium against liability for the consequences of oil spills. If ith heads up production engineering by the shipbuilding industry, the premium is reduced to ZERO - the ship owners will have the marine insurance bargain of the century.

Retrofit Devices of all shapes and hues have been submitted to the National Academy of Sciences Committee on tanker safety. I am familiar with only two of these that appear to have good promise of working.

- The SCOL (System for Control of Oil Leakage) put forward by the Energy Transportation Corporation of New York. This is a system of easily retrofitted sluice valves which might cost in the neighborhood of 1.5 million per ship retrofitted.

The Light Loading system put forward by Mr. George Blake of Overseas Shipholding Group, Inc. this requires no incremental investment but involves a loss of cargo deadweight in the order of 35% which is not offset by any significant reduction of operating costs.

The SCOL system and others are discussed in an excellent SNAME paper by Edmond G. Tornay presented at King's Point 1990, Ship Operations, Management and Economic Symposium. I am sure that both of the above proposals are being given serious cnsideration by the Committee on Tanker Safety.

Many responsible operators think that ships in the size of 200,000 DWT and over are intrinsically unsafe to operate anywhere near land. The three 120,000 DWT double hull ships built at Sun in the '70s are to my view more practical to operate in close quarters than larger ships such as the EXXON VALDEZ of 210,000 DWT. The 120,000 DWT ships have never needed to seriously test their double hull feature in nearly 15 years of operation - in tribute to their size and management. It is of significance that two double hull ships just ordered by Conoco are of 95,000 DWT and that the Concordia Maritime Group of Stockholm have just orderd four 90,000 DWT double hull ships and four 130,000 DWT double hull ships to be built in Sweden. It is also pertinent that AP Moller has just ordered five 280,000 double bottom ships with double bottoms-considering that they will pay off in the event of low energy groundings.

The official views of underwriters on double hulls are reflected in the rates that P & I clubs charge for liability insurance. This is private information and not available. However privately some underwriters have expressed the view that once legislation is enacted, the clubs may discriminate in their 'rating and cover' between single and double hulled tankers.

Another privately expressed view by underwriters is that any move which encourages owner/operator cannot be all bad. Also they express the view that the U.S. is acting in isolation and that more discussions with other classification societies such as NORSKE VERITAS and the European Port State Control would be beneficial. They suggest that the European system which checks on about 25% of the vessels at random in European ports is more efficient/technical than their U.S. counterpart, the U.S. Coast Guard.

The London Salvage Association (LSA) has no specific attitude towards design but are quoted as being of the opinion that double bottoms could reduce pollution claims to a very large degree. The LSA is concerned that double hulls may be more hazardous in grounding situations if you cannot use the requisite amount of compressed air pumping into tanks because of decks that are weaker than the double hulls. This was not true in the case of the TAURUS because a strong water and airtight flat was built 72 feet above the base line. As noted elsewhere it also appeared to have been of no concern in the case of the KOWLOON BAY grounding as reported by them (Page 3).

deck structure weakness

Note: adequate deck strength to take air pressure should be included inthe ABS rules and guidelines for double hulls to provide for this sensible salvage requirement.

US Flag shipowner views are hard to come by. Except for CONOCO no US shipowner has taken a forth right stand for double hulls on environmental grounds. Others appear to be 'neutral'. EXXON has told the writer that they will take the NAS committee recommendations into consideration with respect to their own policy on double bottom when such recommendations are issued. This taken at face value is a small step in the right direction by them. Some foreign shipowner's appear to be moving towards double hulls just as CONOCO has as a matter of enlightened self interest and genuine concern for the environment.

The American Petroleum Institute on May 18th issued a press release reiterating their half truths or worse with respect to the facts relative to oil spills and double hulls. But they made a point to extoll to the National Academy of Sciences committee which is, at the request of the Department of Transportation, investigating tanker safety. They quoted as fact that the committee, financed by the Coast Guard, are using highly sophisticated computerized analytical techniques to analyse double hulls and bring some alternatives thereto to the fore; consideration of which would, of course, introduce further delay in the adoption of doulbe hulls. This is so much hype. It would take years of development and testing to qualify a substitute for double hulls as the best means of or mitigating the effects of oil spills. Furthermore the effort is in fact grossly underfinanced and understaffed even to support a cursory review of the subject by the committee.

The Vice Chairmen of the committee is Mr. William O. Gray formerly an EXXON executive whose actions in the 1970's were largely responsible for scuttling double hulls. His actions in this regard are well documented including his own writings on the subject. The chairman of the committee, Dr. Henry Marcus of M.I.T has told the writer that "he wishes that the API had not made such a release."

With respect to the current policy of the Department of Transportation, MARAD and the Coast Guard their representatives are here today and can speak for themselves.

SUMMARY

It is overwhemingly apparent that the US House and Senate should work with dispatch to resolve their differences on the oil spill legislation and bring the matter to an early vote. There is no technical need to further delay incisive action on double hulls. Purported technical reasons put forward against same represent hipocracy of the highest order. There are both environmental and moral imperatives which demand action. It is to be hoped that the administrations recent movement towards favoring double hulls will accellerate. The concerned citizens of the world will be deeply grateful for prompt US action on behalf of the environment

which supports all life on earth both conservative and 'Liberal', rich and poor. The extra dividend is that properly managed it will enhance the bottom line statements of those who have opposed double hulls to date.

Mr. TORRICELLI. Thank you, Mr. Bergeson, very much.
Mr. Johnson?

STATEMENT OF MR. PETER JOHNSON, SENIOR ASSOCIATE, OCEANS AND ENVIRONMENT PROGRAM, OFFICE OF TECHNOLOGY ASSESSMENT

Mr. JOHNSON. Thank you, Mr. Chairman and members of the Subcommittee, it's a pleasure to be here today. As you suggested, I'll just summarize a few of the points in my statement that I have put out.

The reason I'm here today is that I've been involved in this issue of oil spills in U.S. waters through the Office of Technology Assessment for some time now. Principally, two studies that we've published over the past 15 years, one in 1975 that looked at tanker safety and pollution prevention; and one earlier this year that looked at oil spill cleanup technologies.

I'd like to just point out two major aspects of those studies. One is the prospects for improving oil spill cleanup systems, and two is the prospects for preventing oil spills through tanker construction that we've been discussing here.

We've heard of this before, but I'd just like to make one point about large offshore oil spills. The large spills due to tanker accidents, in particular collisions and groundings, cause significant environmental damage when they are compared to other sources that also spill oil. Even though there a lot of other inputs of oil into the oceans, tanker accidents represent the single largest source, but in addition to that, environmental damage from them is often enhanced because the large quantities of petroleum can be discharged in short periods of time. This is not the case in some other kinds of accidents and as well in normal discharges. In addition, tanker collisions and groundings tend to occur near shore where more sensitive ecosystems can be adversely affected.

Now we all know that Exxon Valdez dramatically illustrated both the vulnerability of modern tankers to catastrophic accidents and the gap between the assumed and actual capability of industry and Government to respond to the resulting spills. OTA's work on both tanker safety and cleanup clearly supports the notion that improving our ability to prevent spills is vital. Even using the best response technology available, or even likely to become available soon, and assuming a timely and coordinated response effort, it is not realistic to expect that a significant amount of oil from a major off-shore spill can be recovered, except under some ideal conditions.

On the subject of prospects for cleanup, however, there are some. Our study covered those. Our recent study concludes that there are prospects for improving cleanup capabilities through more focused development, testing, and thorough engineering and construction, principally of larger and strategically located systems, but most important, through enhanced planning that would result in more rapid decision making of oil spill response, improve logistics, and better training of the organizations that respond to spills.

All the technologies available have certain limitations — and most of them are inherent limitations—however, there are a variety of techniques available. Someone will have to select those tech-

niques when a response is needed and select that for the conditions at hand.

Regardless of the technology, however, the best response is one that is fast and is conducted by a professional team that fully understands the techniques and equipment that they are using.

Our work has also concluded that there are good prospects for improving tanker safety through preventive measures. As I said before, modern tankers are vulnerable to catastrophic accidents. We've seen a lot of evidence of that. They have a potential for releasing millions of gallons of their cargoes into the sea. This has been illustrated by a lot of past accidents, not only the Exxon Valdez.

Our study in 1975 focused on four areas. Peter Noble and others have reiterated those areas including things like ship design and construction, maintenance, and personnel training, and information and control systems, and vessel traffic systems. Those areas are as important today as they were in 1975. There have been improvements in each, but not to the extent at all that common causes of tanker accidents have changed in any dramatic way.

The double bottom and double hull issue has received considerable recent attention, of course, an example of that kind of a remedy that deserves attention today.

As we have heard, as well, the debate about the cost and effectiveness of double bottoms and double hulls is about the same today as it was 15 years ago. Cost is still difficult to agree on and effectiveness cannot really be predicted with absolute certainty. One aspect that has changed, however, is that double bottom tankers have been built, they've seen considerable operating experience. Double hulled tankers have been built. One half of the U.S. flag tankers built in the 1970s and the 1980s were fitted with double bottoms or double hulls. Many industry spokesmen world-wide have announced orders for a number of new tankers with such designs.

In summary, while certainly not a guarantee against future tanker accidents that spill oil, double hulls and double bottoms can make the transportation system much less vulnerable to catastrophic spills, those spills that cause environmental damage. The prospects of preventing a significant fraction of future spills, using those protective structural designs are good. The approach, combined with attention to other measures as well, will go a long way to ensuring a healthier marine environment.

Thank you.

[The prepared statement of Mr. Johnson follows:]

- TESTIMONY -

Peter A. Johnson
Senior Associate
Oceans and Environment Program
Office of Technology Assessment

Before

The Subcommittee on Transportation, Aviation and Materials
The House Committee on Science, Space, and Technology

on

Oil Transportation Safety

May 24, 1990

Mr. Chairman:

Thank you for the opportunity of presenting the results of OTA studies on issues related to oil transportation safety and pollution prevention. The problem of oil spills in U.S. waters has been addressed in two OTA assessments--one principally analyzing tanker safety and pollution prevention, published in 1975--the other evaluating oil spill cleanup technologies, published in March of this year.[1,2] I was the Project Director for both of these studies; I have also prepared several smaller staff papers on these topics over the past several years. For the purpose of this hearing, I would like to present information on two aspects of these OTA analyses: 1) the prospects for improving oil spill cleanup systems and 2) the prospects for preventing oil spills through tanker construction modifications.

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[1]U.S. Congress, Office of Technology Assessment, Oil Transportation by Tankers: An Analysis of Marine Pollution and Safety Measures, July 1975.

[2]U.S. Congress, Office of Technology Assessment, Coping With An Oiled Sea, Background Paper, March 1990.

Large offshore oil spills due to tanker accidents--in particular collisions and groundings--cause significant environmental damage when compared to other sources that also spill oil into the marine environment. While there are many other such inputs--including natural seeps, urban runoff, offshore production and atmospheric fallout--tanker accidents not only represent the single largest source but environmental damage from them is often enhanced because large quantities of petroleum can be discharged in short periods of time. In addition, tanker collisions and grounding accidents tend to occur near shore where more sensitive ecosystems can be adversely affected.

The March 24, 1989, *Exxon Valdez* oil spill in Prince William Sound, Alaska dramatically illustrated both the vulnerability of modern tankers to catastrophic accidents and the gap between the assumed and actual capability of industry and government to respond to resulting major spills. Even though elaborate oil spill contingency plans had been prepared and approved and oil spill equipment had been stocked nearby, this spill quickly got out of hand--and with devastating effects. OTA's work on both tanker safety and oil spill cleanup clearly supports the notion that improving our ability to prevent spills is vital. Even using the best response technology available--or likely to become available soon--and assuming a timely and coordinated response effort, *it is not realistic to expect that a significant amount of oil from a major offshore spill can be recovered, except under the most ideal conditions.*

Prospects for Improving Oil Spill Cleanup

Even though improvements in spill prevention are vital, they are unlikely to eliminate oil spills entirely. "Acts of God" and human error are impossible to fully anticipate or control. Since we can minimize but not eliminate the risk of major spills, technologies for responding to spills are needed when prevention fails.

The oil spill response technologies available today have been designed for calm, protected waters and small spills; they have shortcomings that are most evident when dealing with large spills under adverse conditions. In any case, there is no single or perfect solution to the problem of dealing with oil on the water. Every oil spill is unique, and the approach that works well, or at least reasonably well, in one situation may not work at all in another. This suggests that to be fully prepared for fighting a spill, all approaches must be available.

The use of mechanical containment and cleanup equipment is the primary oil spill response employed in the United States today. Booms and skimmers are used where possible to block the spread of spilled oil and to remove it from the water. This approach is preferable in principle to either dispersing oil in the water column or burning it, the two other important approaches OTA evaluated. Even so, booms and skimmers have seldom been able to recover more than 10 to 15 percent of the oil from a large, offshore spill. Many physical conditions contribute to this low rate of effectiveness:

1) Oil spreads rapidly once spilled. The longer a spill is allowed to spread, the more equipment is required. After four days, a spill the size of the *Exxon Valdez* can cover 15 to 20 square miles.

2) The composition of oil varies, both from cargo to cargo and over time once it is spilled, and different compositions require different approaches. Highly viscous oil, for instance, is more difficult to recover than medium viscosity oil. Moreover, oil spilled in rough seas quickly emulsifies as it mixes with water. It then becomes very difficult to pump, and the volume that must be recovered increases greatly.

3) Most existing mechanical equipment cannot cope with waves greater than 6 feet, winds greater than 20 knots, or currents greater than one knot. Much of this equipment was designed for use in ports and harbors, and is inadequate for most offshore purposes.

4) Weather, such as snow, fog, heavy rain, high winds, and low temperatures all adversely affect the deployment and operation of oil spill response equipment.

5) The location of a spill affects how fast and with what type of equipment a response can be launched. The *Exxon Valdez* spill, for instance, was in a very remote location, so logistical problems had a major impact on the amount of oil ultimately recovered.

Although improvements in mechanical recovery technologies can be expected from stepped-up research and development efforts, these efforts are unlikely to result in dramatic increases in the total oil recovered from major spills. Some ideas that could make a difference include the use of dual purpose vessels, such as dredges designed or retrofitted with oil spill equipment. In general, the improvements likely to be most effective are those that involve larger, more costly equipment, strategically located for quick response.

The use of chemicals to disperse oil is a secondary spill response approach in the United States. Such dispersants have long been controversial in the United States, although they are a primary response approach used in some countries, including the United Kingdom. Dispersants do not actually remove oil from the water. Instead, they break an oil slick into small droplets, which then disperse into the water column, where they are then subjected to natural processes such as biodegradation. Early dispersants were toxic to many marine organisms; those currently available are less toxic than the oil they disperse. Nevertheless, the dispersed oil itself is toxic until it breaks down or is diluted sufficiently, and it will impact a larger volume of the water column than it would if some of the oil was picked up mechanically before the remainder was dispersed by natural processes. This may be preferable, however, if some of the spilled oil would otherwise reach beaches or other sensitive coastal areas, where cleanup becomes even more difficult and costly.

The effectiveness of dispersants is now perhaps of more concern than their toxicity. Experts disagree about how effective dispersants are, and there is as yet no reliable method to test effectiveness in field operations. Although some currently available dispersants have proved effective in ideal situations, ideal conditions rarely exist in the real world. Research to improve dispersant effectiveness is continuing and appears to be producing some encouraging results.

Burning spilled oil from the surface of the ocean also has advantages and disadvantages. This technique is not currently an important oil spill response tool of any country, but some small-scale experiments have produced burn percentages of over 90 percent, and thus high rates of oil removal and destruction. The accidental burning of oil spilled from such ships as the Burmah Agate (in 1979) also indicates that burning has the potential for removing large percentages of oil from the sea. If burning is successful at removing the oil from the sea, however, pollution is transferred to the air. Even so, the short-term impact of smoke and combustion products may be preferable to the longer-term impacts of an oiled shoreline. In some circumstances burning could jeopardize a stricken vessel and any oil remaining on board--oil which might otherwise be off-loaded. And, as with dispersants and mechanical methods, burning is only applicable in certain circumstances: igniting and keeping a slick burning may be difficult since oil must be relatively fresh and at least 3 millimeters thick in order to burn. The oil residue that remains on the water aft(burning is a pollution problem that must also be addressed.

Regardless of the technology employed to fight spills, the effectiveness of a response can be greatly enhanced if a *rapid* response is mounted by a professional response team that understands which techniques are best under which conditions. The speed of a response is critical and is dependent on rapid decision-making, logistics,

and training. These factors are at least as important to a successful response to an oil spill--if not more so--than the specific technologies used. *It is in these non-technical areas that the most rapid gains in responding to oil spills can be made.*

If important decisions, such as how to deploy mechanical equipment and whether to use dispersants, are not made within the first few hours after a major spill, the spill will rapidly become beyond effective control. Rapid decision making has been difficult in the United States, in part because the oil companies that have the responsibility to clean up major spills do not at the same time have the authority to use all means they deem appropriate. One option to enhance rapid decision making would be to provide more centralized authority within the government. In addition, more thorough contingency planning could result in a greater number of decisions made without delay.

In any case, having the right equipment on scene when needed is essential to a rapid response. Whether equipment is strategically sited or moved rapidly to a spill site, all the necessary equipment must be available. A recovery effort will only be as good as the weakest link in the system. Often overlooked are adequate ships or barges to accept recovered oil, temporary storage sites, and a means to permanently dispose recovered oil.

Finally, it is necessary to assure an adequate cadre of trained oil spill response professionals. For maximum effectiveness, professional training must include the conduct of periodic exercises and contingency plan testing. The best technology is always limited by the competence of the operating personnel, especially in this field where specialized response to the unique spill condition is a requirement.

Prospects for Improving Tanker Safety

Modern oil tankers are vulnerable to catastrophic accidents that have the potential of releasing millions of gallons of their cargoes into the sea. This has been illustrated not only by the *Exxon Valdez* accident but by a number of serious oil spills over the past two decades. However, each spill is unique, the severely damaging ones are few in number, and they have occurred in various locations worldwide. These factors make generalization difficult and lead to many spills escaping public attention. The OTA study of tanker transportation and oil spills in 1975 focused on four areas where improvements could enhance tanker safety and accident prevention:

1) Ship design and construction (Including double bottoms and double hulls)
2) Ship maintenance and inspection
3) Personnel training and licensing
4) Information and control systems (including vessel traffic control)

These four areas are just as important today as they were in 1975. There have been improvements in each but not to the extent that common causes of tanker accidents have been changed dramatically. While new technologies have been introduced--such as collision avoidance radar systems and automated controls--the applications of technologies in some critical areas has lagged. In addition, some areas of government oversight such as inspection and operation of vessel traffic controls have not kept pace with original plans. OTA has not developed a current statistical base to illustrate the effects of any changes in these four areas over the past 15 years, but the one area of double bottoms and double hulls has received considerable recent attention and is an example of an old remedy that may be worth revisiting.

In 1975, large tanker spills that were making the news included: the *Metula*, in the Strait of Magellan and the *Jacob Maersk* off Portugal. In addition, the *Argo Merchant* spill off Cape Cod in 1976 brought these concerns more directly to the American public.

Double bottoms or double hulls on tankers were not a common approach toward tanker safety enhancement in 1975 and many industry groups were opposed to such measures. A few, however, were advocates and some double bottom and double hull tankers were built in 1975. Of course, the concept has been used in ship design to serve a number of purposes, including safety, for some time. The question of regulations requiring a specific hull configuration for tanker designs, however, brought considerable debate.

The OTA 1975 report addressed questions of cost, effectiveness, other safety factors and salvage for tankers constructed with double bottoms or double hulls. In general, the issues with the greatest divergence of opinion were cost and effectiveness. OTA concluded that a wide range of added costs could be estimated but that U.S. shipyard premiums for double bottoms and double hulls, at the time, appeared to be approximately 3 and 5 percent respectively. On effectiveness, OTA concluded that double bottoms and double hulls offered a significant degree of protection from oil pollution in the event of groundings or collision accidents that represent serious threats to the environment.

The debate about costs and effectiveness of double bottoms or double hulls on tankers is about the same today as it was in 1975. Costs are still difficult to estimate and effectiveness cannot be predicted with absolute certainty. Very little additional accident data is currently available that could shed light on the levels of prevention certain tanker

designs could offer. The one aspect that has changed, however, is that a number of double bottom tankers have been built and have seen considerable operating experience. About one-half of all U.S. flag tankers built during the 1970's and 1980's were fitted with double bottoms or double hulls and industry world-wide has recently announced orders for a number of new tankers with such designs. In addition, many industry spokesmen have recently indicated their belief that these hull design features represent a modest price for enhanced prevention of catastrophic spills in the future.

In summary, while certainly not a guarantee against future tanker accidents that spill oil, double hulls and double bottoms can make this transportation system much less vulnerable to catastrophic spills--those that can cause significant environmental damage. The prospects for preventing a significant fraction of future spills using these protective structural designs are good. This approach, combined with attention to other prevention measures as well as an enhanced oil spill response capability would go a long way toward ensuring a healthier marine environment.

Mr. TORRICELLI. Thank you, Mr. Johnson.

Mr. Olson and Mr.Bechtal, I understand Mr. Bechtal will be delivering the statement?

Mr. OLSON. I was going to give an overview and Mr. Bechtel was going to simply talk about double hulls.

Mr. TORRICELLI. That's fine, but recognizing that you are both from the same organization, I'd like one statement.

Mr. BECHTEL. I think his is most unique in trying to give an economic cost as well as the cost to the damage of the environment. I was addressing the new House offer to the Senate, is where I was focusing.

Mr. TORRICELLI. On double hulls?

All right, let us try, though, please do not deliver the entire prepared statement.

Mr. OLSON. Yes, I was just going to—

Mr. TORRICELLI. Mr. Bechtel, if you'd just give us your comments then about the House offer, please?

Mr. Olson, please proceed.

STATEMENT OF MR. ERIK OLSON, COUNSEL, ENVIRONMENTAL QUALITY DIVISION, NATIONAL WILDLIFE FEDERATION; ACCOMPANIED BY: RICH BECHTEL, NATIONAL WILDLIFE FEDERATION

Mr. OLSON. Thank you.

I am Erik Olson, the counsel for the Environmental Quality Program at the National Wildlife Federation, which is the Nation's largest citizen conservation organization with over 5.8 million members and supporters.

In the wake of the Valdez oil spill and other major spills over the last year, we've learned that prevention is really the only answer to the continuing plague of oil spills. Containment and cleanup technologies are primitive and often ineffective. Incredibly, most oil tankers are not designed and equipped with readily available technologies such as double hulls that would minimize the likelihood and environmental impact of spills.

Spills cause a variety of short term, or acute, and longer term impacts on the environment. Many of these effects are poorly understood. The National Academy of Sciences in 1985 pointed out that the extent and the impacts of these spills depend on numerous variables. Unfortunately, in the case of a catastrophic crude spill like the Valdez into a relatively pristine, biologically very rich and sensitive ecosystem, the effects of the spill likely will not only be the immediate deaths of what was over 1,000 sea otters, over 33,000 waterfowl, over 150 bald eagles, and much other wildlife and fish. There are those acute impacts, but in addition there are long term impacts, the chronic effects, on some species, food sources, and subtle chronic effects on the ecosystem that will last for many years.

Many oil companies apparently believe that these impacts are an acceptable cost of doing business, in part because they really haven't had to pay for the full costs of the spills that those spills wreak on the environment and on society. The companies, we believe, have misread the market and the American public's wishes.

Repeatedly consumers have demonstrated they are willing to pay for environmental protection. Adopting the best available oil spill prevention and cleanup measures would cost at most just pennies per barrel. Several tuna companies recently learned that consumers are more than willing to pay the few cents per can of tuna needed to protect dolphins. This is a lesson oil companies might learn when they're adopting better oil spill prevention measures.

In addition, it's important to point out that the economics of oil spills are really changing in the last couple of years. The Valdez spill is just one example of this new approach. As we've heard, the cleanup has already cost over $2 billion according to Exxon. On top of these costs, something that people have not been talking about are the natural resource damages of the spills. These damages include the costs of efforts to restore, replace, or acquire the equivalent of the injured natural resources as well as the payment for the lost values of the resources. The total price tag for the Valdez spill is going to be staggering, likely many billions of dollars more than the cleanup costs.

Under the decision of the D.C. Circuit in the State of Ohio case last year, these costs are going to increase significantly in the near future. Thus, with these more sophisticated laws and economic techniques, oil companies and transporters will have to pay significantly more in the wake of a spill.

These costs don't even consider the social impacts of the spill, such as the loss of fishing and subsistence use of nature's bounty. Social workers and public officials have recently begun to document a wide variety of social problems that have resulted from catastrophic spills like the Valdez. For example, it's now been documented that the rates of alcoholism, child abuse, and other social ills are increasing in the wake of the Exxon Valdez spill, something that was quite unexpected.

Of course the damage payment often simply cannot restore the environment or bring back the destroyed livelihoods and lost ways of life. In some cases irreplaceable resources can be lost as a result of a catastrophic spill. We believe, as stewards of this planet for current and future generations, we have an obligation to avoid destroying the irreplaceable and sensitive parts of our dwindling natural world.

Society has a right to demand that oil transporters take every reasonable measure to prevent oil spills. With the escalating cleanup costs and natural resource damages, these measures also are becoming economically more attractive to potential spillers, as we heard Conoco say today.

There is no technique yet developed that could fully compensate society for the destruction of priceless natural resources such as Prince William Sound. As we'll hear now, the techniques such as double hulls really need to be put into place immediately. The debate has been going on for over 15 years. We think it's time for Congress to put its foot down.

Thank you.

Mr. TORRICELLI. Thank you, Mr. Olson.

Mr. Bechtel?

Mr. BECHTEL. I would focus on the House offer that I think went over yesterday—I'm not certain—to the Senate formally. The first

part of it—the House offer retains the mandate that was in the House bill that all new vessels will be built with double hulls. The first part of my testimony basically was a short synopsis of the 17 years that the Federation has participated in rule making proceedings on double hulls and double bottoms and the frustrations that were involved in that. NRDC, Sarah Chasis' organization, were participants with us as were about eight other organizations. It was a 17 year history without any results.

So we're very pleased with that that the House offer retains the mandate that was essential to us and our community. But we were dismayed because the conferees scuttle the double hull mandate with three 25 year exemptions until the year 2015 when all vessels visiting the Louisiana off shore oil port, all vessels lightering more than 60 miles from the coast, and all inland barges will be exempt for those 25 years. The loop in lightering exemptions will keep our oldest single hulled tankers in service for another 25 years and draw the world's fleet as well—the oldest of the world's fleet. They will undermine international adoption of the double hull standard, which we think will occur, if all vessels in U.S. waters must meet the standard, but not if all vessels are, as they age, can move to lightering or use the loop.

A catastrophic oil spill can occur wherever a vessel is operating. Safety records don't give complete guidance since a disaster can strike anywhere at anytime. The probability increases as the vessels age and these older vessels will be moving to the lightering and to the loop.

The Coast Guard recommended, in 1979, that all inland barges be built with double hulls, and after 1985—it was a six year phase in period—all barges over 20 years should be non-certified. They found that barges posed significant environmental hazard and that double hulls could reduce inland oil pollution by 80 percent.

The final problem in the proposal is the very slow phase in period. The public will receive the benefit of double hulls—will not receive the benefit of double hulls until they are on the vessel, vessels which are in service. The proposal forces conversion or retirement of tankers 40 years and older in 1995 and progress to 2005, a 15 year period, when all vessels must meet the double hull standard as they turn 25 years old. This means that few new double hulled vessels will enter into the service because older fully depreciated tankers will depress shipping rates and place new vessels at a disadvantage.

There will be no requirement to bring safer vessels into service until the deadlines are reached and the older vessels are forced to retire. We think a phase in period must be more prompt. Now is the time to act since a 15 year old vessel is three times more likely to suffer structural failure than one 10 years old and because the Alaska fleet now averages 19 years in age and the world fleet is 14. Now is the time.

[The prepared statement of Mr. Olson and Mr. Bechtel follows:]

Working for the Nature of Tomorrow®

NATIONAL WILDLIFE FEDERATION

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STATEMENT OF

ERIK D. OLSON,

NATIONAL WILDLIFE FEDERATION

HEARING ON OIL TRANSPORTATION SAFETY

BEFORE THE

SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS

OF THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,

UNITED STATES HOUSE OF REPRESENTATIVES

MAY 24, 1990

STATEMENT OF
ERIK D. OLSON, COUNSEL,
ENVIRONMENTAL QUALITY DIVISION
NATIONAL WILDLIFE FEDERATION

Mr. Chairman and Members of the Subcommittee, I am Erik D. Olson, Counsel for the Environmental Quality Division of the National Wildlife Federation ("NWF" or "the Federation"). The Federation is the nation's largest citizen conservation organization, with over 5.8 million members and supporters, and with 51 affiliated organizations in U.S. States and Territories. We appreciate this opportunity to testify on oil tanker design and cleanup of oil spills. I will discuss the economic and environmental impacts of oil spills, and Mr. Rich Bechtel of NWF will then discuss the preventative measures available to keep oil spills from occurring.

In the aftermath of the Exxon Valdez oil spill and other major spills in the last year in New York, New Jersey, California, Pennsylvania, and many other States, we have learned that prevention is the only answer to the continuing national plague of oil spills. Containment and cleanup technologies are primitive and often ineffective. Incredibly, most oil tankers are not designed and equipped with readily available technologies --such as double hulls and double bottoms--that would minimize the likelihood and environmental impact of spills.

Oil spills cause a variety of short-term ("acute") and longer term ("chronic") impacts on the environment. Many of

these effects are poorly understood. A review of the effects of marine oil spills completed by the National Academy of Sciences in 1985 noted that the extent of the effects of spills depends on factors such as the amount and type of oil spilled, the ecosystem into which the oil was spilled, prevailing weather conditions, the effectiveness of cleanup and containment measures, and certain other variables.[1] Unfortunately, in the case of a catastrophic crude oil spill like the Exxon Valdez into a previously relatively pristine, biologically very rich and sensitive ecosystem, the effects of the spill likely will not only be immediate deaths of otters, waterfowl, eagles, and other wildlife and fish from oil ingestion, hypothermia (freezing to death), and related acute impacts. There also will be long-term impacts on reproduction of some species, on food sources, and other subtle chronic effects on the ecosystem that likely will last for many years.

Many oil companies apparently believe that these impacts from oil spills are an acceptable "cost of doing business," in part because they generally have been able to escape paying the full costs of the damages their spills wreak on the environment and on society. These companies have misread the market and the

1. National Research Council, National Academy of Sciences, Oil in the Sea: Inputs, Fates, and Effects, National Academy Press (1985).

American public's wishes. American consumers repeatedly have demonstrated that they are willing to pay for environmental protection; adopting the best available oil spill prevention and cleanup measures would cost at most just pennies per barrel. Several tuna companies recently learned that consumers are more than willing to pay the few cents per can of tuna needed to protect dolphins--a lesson that the oil companies might learn when planning for better oil spill prevention measures.

It is also important to note that the economics of oil spills are changing. The Exxon Valdez spill is but one example of an emerging broader approach to oil spill damage calculation and damage collection. Exxon says that the cleanup alone has cost the company over $2 billion already, and cleanup activities continue today. On top of those cleanup costs, the "natural resource damages" from the Exxon Valdez spill will have to be paid. These damages include the costs of efforts to restore, replace, or acquire the equivalent of the injured fish, wildlife, and other parts of the ecosystem, as well as the payment for the lost value of destroyed resources. The total price tag for the natural resource damages from the Exxon Valdez spill are going to be staggering--likely many billions of dollars more than the cleanup costs.

Under the State of Ohio et al. v. U.S. Department of the Interior, 880 F.2d 432, decision of the U.S. Court of Appeals for

the District of Columbia Circuit here in Washington, the costs of natural resource damages are going to be significantly higher than many oil companies had hoped. Thus, with new more sophisticated laws and economic techniques, oil companies and transporters will now have to pay significantly more in the wake of an oil spill.

These natural resource damage costs generally do not consider many of the social impacts of the spill--many fishermen and subsistence users of nature's bounty in Alaska, for example, lost their livelihood after the spill. Moreover, social workers, public officials, and citizens report a wide variety of social problems have resulted from catastrophic oil spills.[2] In small Alaska communities hard hit by the Exxon Valdez spill, peoples' way of life was drastically changed by the radical shift in the local economies created by the death of the fishing economy and the influx of spill cleanup jobs and cash.[3] Surprising jumps in

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2. See, e.g., National Wildlife Federation, Natural Resources Defense Council, and Wildlife Federation of Alaska, The Day the Water Died: A Compilation of the November, 1989 Citizens Commission Hearings on the Exxon Valdez Oil Spill (1990)(testimony of public officials and citizens on the numerous unexpected social and environmental impacts of the spill); cf., National Oceanic and Atmospheric Administration, Asssessing the Social Costs of Oil Spills: The Amoco Cadiz Case Study, (1983)(emphasizing several direct social costs, such as loss of recreation and tourism).

3. The Day the Water Died, supra.

the rates of alcoholism, child abuse, and other social ills are now being documented in many areas affected by the spill in Alaska.[4] This cascade of impacts on the communities hardest hit by catastrophic spills is hard felt, and generally has been poorly documented, but is very real.

Of course, damage payments often simply cannot fully restore the environment or bring back destroyed livelihoods or lost ways of life. In some cases, irreplaceable resources can be lost as a result of a catastrophic spill. Moreover, there are ethical reasons why the environmental destruction from wanton oil spills should be prevented. As stewards of this planet for current and future generations, we have an obligation to avoid destroying irreplaceable and sensitive parts of our dwindling natural world.

Society has a right to demand that oil transporters take every reasonable measure to prevent oil spills. With escalating cleanup costs and natural resource damages, these measures also are becoming economically more attractive to potential spillers.

As the attached more detailed review of the damage assessment process for the Exxon Valdez demonstrates, the devastation from that spill has been substantial. But we still have a long way to go to improve our damage assessment process for the Exxon Valdez and other oil spills.

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4. Ibid.

There is no economic technique yet developed that could fully compensate society for the destruction of priceless natural resources such as those in Prince William Sound. As Mr. Bechtel will discuss next, we simply must mandate better techniques for oil spill prevention. Only by preventing more catastrophic oil spills can we as a society avoid continuing to pay the unacceptable toll imposed by the never ending stream of oil spills.

DETAILED COMMENTARY ON THE GOVERNMENT'S DAMAGE ASSESSMENT FOR THE EXXON VALDEZ SPILL

The Exxon Valdez oil spill is probably the greatest single ecological catastrophe in United States history, and apparently the oil industry has not learned the lessons. But the government Trustees have abdicated their duty to fully assess the environmental devastation wreaked by this spill. Three of the most important problems with the governments' damage assessment have been: (1) the Trustees' refusal to initiate many important studies, and their recent secret decision to terminate approximately 24 of the most important studies now that the spill has receded somewhat from public attention; (2) the Trustees' failure to develop plans for, and to assess the costs of, restoring, replacing, and acquiring natural resources equivalent to those injured or destroyed; and (3) the fact that lawyers, rather than scientists, have driven the assessment process, interfering with scientists' efforts to fully analyze the spill's impacts, and to assure the all-important open scientific process needed to fully assess the impacts of the spill.

Impacts of the Spill

It is likely that millions of animals and fish have been killed or severely injured by the spill. In terms of dead animals and birds and widespread ecological disruption, the Exxon Valdez probably was the worst oil spill ever in the world. Scientists have recovered the carcasses of about 150 Bald Eagles, 1,000 sea otters, 35,000 waterfowl and other birds, and the dead bodies of many other forms of life ranging from deer to whales that likely were killed by the spill.

But these carcasses represent only the most obvious impacts of the spill; they are only the tip of the iceberg. For example, studies have found that when scores of tagged bird carcasses are dumped into the areas being monitored or cleaned up, workers are only able to find about a tiny percentage of the actual number of dead birds. Thus, it is likely that many hundreds of thousands of birds have died from acute poisoning or by loss of their ability to retain heat due to oil-soaked feathers, but that their bodies never will be found. Sea otter pups also are highly sensitive to spilled oil, because of their tendency to be fearless and playful in the oil-stained seas, and their ready susceptibility to death by hypothermia once their fur is soaked in oil. But dying sea otters often drag themselves into secluded shore brush or other hard-to-find areas to die, or their lifeless

bodies sink to the sea floor, and their carcasses are never recovered.

While dead birds and otters have received much public attention, many of the impacts of the Exxon Valdez oil spill cannot be captured by TV cameras or on magazine covers. These more subtle and insidious impacts are more difficult and expensive to measure than the collection of otter and bird carcasses. The entire food web of the affected areas of Prince William Sound, the Kenai Peninsula, Kodiak Island, and many bays and estuaries along the Alaska Peninsula have been seriously disrupted. Preliminary studies indicate that many birds cannot reproduce or have severely limited reproduction in the wake of the spill. The eggs of bald eagles, for example, die when they are exposed to just a few drops of oil brought to the nest on the feathers of unwitting adults. In addition to reproductive problems, the spill has killed many of the organisms that make poor photographic subjects, but that form the foundation of the area's entire food web. These include the tiny phytoplankton, zooplankton, and algae that fill the waters and are eaten by small fish and animals, which in turn are eaten by larger animals, on up the food chain to fish, bears, eagles, and humans.

The spill's impacts on these food web interactions and on the tiny or seemingly obscure but critically-important species that generally escape media attention are crucial, and must be studied over the long-term. Many of these impacts will result from chronic, long-term oil exposure and will take years to manifest themselves.

The Damage Assessment to Date.

Unfortunately, the state and federal "Trustee Council"[1] has been rife with bickering. Primarily due to the opposition of the federal Trustees and the Justice Department to conducting

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1. The Trustee Council is made up of the representatives of the Department of Agriculture (because of the National Forest lands affected), the Department of the Interior (because of National Parks, Wildlife Refuges, and other certain resources affected), the Commerce Department (because of marine resources under the stewardship of the National Oceanic and Atmospheric Administration), and the State of Alaska.

research on many of the spill's impacts, the job of fully assessing injuries from this environmental catastrophe simply is not being done. There is no "lead" Trustee and the state has been cut out of many important Trustee discussions. The scientific cooperative agreement between the state and the federal agencies has been terminated, with no clear decision on whether it will be revived. The federal government repeatedly has insisted that certain studies should not be completed because they will be too expensive. Other studies will not go forward because some lawyers believe that it will be hard to recover large amounts of money for damages to certain resources, such as a disrupted food chain. But all of those studies are crucial to obtaining a complete picture of the overall spill impacts; they also could form the basis of large damage recoveries difficult to predict before the studies are completed.

When the damage assessment initially was announced to the public in August, 1989, the Trustees already had decided not to conduct many of the needed studies. In addition, the State/Federal Trustees' Damage Assessment Plan announced that although it was expected that many of the impacts of the spill would continue for many years and in some cases would not even be manifested for years, all studies would terminate by February, 1990. Extensions were to be permitted only if the Trustees decided that, in their wisdom and judgment, without any form of public disclosure or review, the studies should be continued after that date. Those decisions to terminate the studies now apparently have been made. We have learned that approximately 24 of the original studies have been recommended for termination, and that seven more studies are still on the chopping block. The public and Congress have not been notified of these facts. However, we understand that critically-important studies such as certain studies on mink, river otters, birds including marbled murrelets, storm petrels, pigeon guillemots, kittiwakes, glaucous-winged gulls, and sea ducks, fish such as sportfish, oysters, larval fish, rockfish, scallops, sea urchins, and Dolly Varden Char, deer, certain marine mammals such as humpback whales, and on black bears, likely will be terminated or so severely cut back that they may not provide meaningful results. Without these and other critically-important studies, the public will never know the extent of the damage wreaked by the spill, and Exxon and the Alyeska consortium could escape paying the full costs of the ecological damages they have caused.

The second important problem with the assessment stems from the Trustees' failure to focus on assessing the costs and

feasibility of restoring, replacing, or acquiring the equivalent of natural resources destroyed or injured by the spill (collectively referred to as "restoration"). In State of Ohio v. U.S. Department of the Interior, 880 F.2d 432, the U.S. Court of Appeals for the D.C. Circuit made it clear that polluters must pay for environmental restoration plus the lost value of the resources after an oil spill. In this case, to which the National Wildlife Federation was a party, the court struck down the Interior Department's damage assessment rules, and held that Interior must revise its rules to, among other things, comport with the law's requirement that the environment be restored by the polluter after oil and toxic substance spills and releases.

However, the Trustees are only now beginning to develop their initial plans to look at restoration. To our knowledge, no actual restoration projects or studies of restoration costs have been initiated, a year after the spill. A conference held in Anchorage late in March was the first preliminary effort to look seriously at options for restoration. The Trustees simply have not given this central issue sufficiently serious attention.

A third major problem that has arisen during the assessment derives from the role of lawyers in deciding how the assessment should be conducted. The assessment has had its parameters decided by lawyers and policy makers who often have little appreciation for many of the more subtle and difficult to measure, but ecologically extremely important, impacts of the spill. This problem has been severely exacerbated by the Interior Department's view--well stated in their damage assessment rules and informal policy positions--that damages must be proved with extremely cumbersome and detailed studies, and that many studies cannot be justified because they are too expensive. The scientists conducting the studies often have been ignored or overruled. The Interior Department and Justice Department have sought to terminate any study that they feel may not result in large dollar economic recoveries, even if the actual environmental impacts on the resources to be studied may be significant.

This is short-sighted and will result in a poor understanding of the overall impacts of the spill. Only an open scientific process in which data are shared by all scientists will assure that the damage wrought by the spill is adequately studied.

A final generic problem with the assessment has been the surprising tendency of the governments to keep the studies and

virtually the entire assessment process secret from the public. The only document related to the assessment ever released to the public--the August, 1989 State/Federal Damage Assessment Plan--simply described studies the Trustees already had designed and started. That Plan was simply an historic document, discussing decisions already made and studies already undertaken. Similarly, the recent decisions to terminate many of the critical studies were made behind closed doors, with no opportunity for the public or outside scientists to review the data or to comment. There has been virtually no meaningful opportunity for public input into the assessment process. This problem was perhaps best exemplified by the Justice Department's recent attempt to secretly reach a plea bargain agreement--without so much as consulting the state until the eleventh hour, and without ever informing the public of the existence or substance of the agreement. We are very disappointed that the Justice Department has refused to clear the air and to explain to the American public its proposed plea bargain, and its plans for assuring that the ecological devastation from the spill is addressed.

Recommendations

We have four recommendations as a result of our experience with the damage assessment for the Exxon Valdez spill:

1. Congress should address the need for immediate damage assessment funding for the Exxon Valdez, and for other oil spills. Exxon has refused to pay for most of the needed damage assessment studies, and the agencies have not asked for adequate funding. Congress should immediately mandate, and appropriate sufficient funds to pay for the next two years of damage studies for the Exxon Valdez spill. This will guarantee that critical data are not lost and that the spillers are held responsible for the full extent of damages. These assessment costs ultimate~~ly~~ are recoverable from the spillers. In the future, Congress must establish a mechanism for Trustees to tap into a Fund without having to wait for appropriations, so that they can collect the necessary data immediately after a spill.

2. Congress should send a clear signal to the Trustees in the Exxon Valdez case that full damages, including restoration of all parts of the environment devastated by the spill, must be recovered.

3. In adopting comprehensive oil spill legislation, careful attention must be paid to the problems that have arisen in the Valdez assessment process. The new law should: (a) provide an opportunity for citizens to force Trustees to perform their duties when they are not doing so; (b) require the damage assessment rules to be overhauled so they will help rather than hinder Trustees' recovery of damages; (c) mandate more meaningful public participation in the assessment process; and (d) provide that studies of the overall impacts of the spill on the ecosystem, and on important components of the food web, must be conducted irrespective of whether Trustees can be sure that large economic damages will be recovered as a result of those studies.

4. Congress should insist that the Trustees provide the public a meaningful role in the Exxon Valdez damage assessment process as well, and should hold the government publicly accountable for its assessment and any settlement of its litigation in this case.

Conclusion

With the actions proposed above, the damage assessment of the Exxon Valdez spill would be significantly improved. If we learn the lessons from this spill, perhaps in the future damage assessments for other spills will be better planned and executed.

BIOGRAPHY FOR ERIK D. OLSON

Erik D. Olson is the Counsel for the Environmental Quality division at the National Wildlife Federation (NWF), which is the largest environmental group in the country (with over five million members and supporters). At NWF, he has specialized in hazardous waste, oil spills, groundwater, and safe drinking water since 1986. He has been lead counsel in major environmental cases for the Federation including State of Ohio v. U.S. Department of the Interior, 880 F. 2d 432 (D.C.Cir. 1989), State of Colorado v. U.S. Department of the Interior, 880 F. 2d 481 (D.C.Cir. 1989), and In Re Acushnet River and New Bedford Harbor: Proceedings Re Alleged PCB Pollution, 712 F.Supp. 1019 (D. Mass. 1989). He has co-taught an environmental law seminar at the University of Virginia School of Law, and formerly taught courses in environmental law at the University of Maryland, University College.

Previously, he was an attorney at the Office of General Counsel, of the U.S. Environmental Protection Agency, where he litigated environmental cases in the D.C. Circuit, Eighth Circuit, Tenth Circuit, and other courts. At EPA's General Counsel's office, he worked on the Safe Drinking Water Act, hazardous waste, and the Clean Water Act. He had worked before then with the National Wildlife Federation on acid rain, clean air and clean water, and strip mining law.

Mr. Olson received his J.D. from the University of Virginia; he was inducted into the Order of The Coif legal honor society, was on the editorial board for the Virginia Journal of Natural Resources Law, and was a National Conservation Fellow. He received his B.A. in an independently-created major, Environmental Biology and Management, from Columbia University.

Mr. TORRICELLI. Thank you, Mr. Bechtal.
Ms. Sarah Chasis?

STATEMENT OF MS. SARAH CHASIS, SENIOR ATTORNEY, NATURAL RESOURCES DEFENSE COUNCIL

Ms. CHASIS. Thank you, Mr. Chairman and members of the Committee. Two days before the anniversary of the Exxon Valdez spill my organization, NRDC, released a report which I believe you all have copies of entitled, "No Safe Harbor." In that we looked at oil transportation safety issues focusing specifically on three of the Nation's busiest ports, New York, San Francisco, and L.A. to see whether a similarly catastrophic spill could occur in those areas. Based on the size of the tankers that regularly visit those ports, the navigational hazards present, the history of groundings, collisions, and spills that had occurred, we concluded that those harbors are ticking time bombs just waiting for another spill to happen. Shockingly now, more than a year after the Alaska spill, most of the important measures to prevent such an occurrence have not been put into place and we are distressed.

A few of the important findings of our report I'd like to highlight for you today.

We found that from 1980 to 1988 tankers in the U.S. were involved in 468 groundings, 371 collisions, 97 rammings, 55 fires and explosions, and 95 deaths.

Since 1978 there have been an average of 18 tanker and barge spills each exceeding 10,000 gallons per year. Of catastrophic U.S. marine spills—that is spills exceeding 1 million gallons—since 1976, all eight were the result of tanker accidents.

Mr. Chairman, I know that you're particularly interested in New York Harbor and we found that oil spills occur daily in New York Harbor with often two or three spills occurring in one day. Over the last 13 years, at least 15 large spills have occurred in the harbor, dumping at least 2.4 million gallons of oil. At least 10 of these were spills from barges. Groundings caused five of the spills. Every day an average of four tankers, each carrying an average of 13 million gallons, enter the harbor. These tankers travel through areas notorious for groundings and through areas with risk of collision. The threat of a very large spill similar in size to the Exxon Valdez is a real problem.

The record of spill containment and cleanup is nothing less than dismal, as I think we all recognize. The data indicate that only 10 percent to 15 percent of spilled oil is typically recovered. In Prince William Sound less than 10 percent of the 11 million gallons has been recovered despite Exxon's $2 billion cleanup efforts to date.

In terms of prevention—which is clearly the thing we have to focus on—we see as the main areas of opportunity the requirement for double hulls and bottoms, better pilotage, navigational aid improvements, and minimizing tanker transport in sensitive areas.

I think the double bottom and double hull issue has been covered very effectively by the other panelists. I would just like to say that, from our organization's perspective, because of the Coast Guard's failure to impose a double bottom/double hull requirement, despite the overwhelming evidence, we believe it is imperative that Con-

gress act to impose this requirement leaving no opportunity for the Coast Guard to subsequently waive such a requirement.

We are very concerned about another issue that has received attention and that is the need for improved pilotage. Currently there is an archaic system whereby the Federal Government regulates pilots on vessels in domestic trade and States regulate pilots on vessels in foreign trade. We believe both systems of regulation need close scrutiny and improvement.

Federal regulations, we believe, are inadequate in several respects. For example, someone can obtain a license to pilot a supertanker such as the Exxon Valdez based on experience on vessels only a fraction the size and licensed pilots are not required for self-propelled vessels including barges under 10,000 gross tons—we believe a significant exemption since vessels of this size carry large amounts of oil, and barges in particular account for a large proportion of spills.

Enforcement at the State level of pilotage requirements varies tremendously. According to a congressional report, disciplinary action was taken by State pilotage boards in only 19 cases out of 390 cases referred by the Coast Guard in a 27 year period. In our testimony we cite some dramatic instances in which there has been a real failure on the part of State agencies to properly take enforcement action.

We think there is real need for reform at both the State and Federal level of pilotage requirements.

Another area for improvement, we believe, in terms of tanker safety, is through improved navigational aids. Vessel Traffic Service systems help guard against tanker groundings and collisions by determining the position of vessels through such means as radar surveillance and vessel radio reports. However, currently there are only five harbors in the country where VTS systems are in place, San Francisco, Prince William Sound, Puget Sound, the Houston/Galveston area, and Berwick Bay, Louisiana. Now New York Harbor will be getting a VTS system which will be partially operational this summer.

Unlike traffic control systems, participation in the VTS, however, is not always mandatory. In addition, the systems are passive. The Coast Guard advises ships of their position, but does not control their movements as a general matter. Also VTS systems do not always cover the full port area. For example, in San Francisco, five of the six major oil refinery docks are located outside VTS radar coverage.

We believe that VTS systems need to be expanded to cover additional ports and harbors and that the geographic range with harbors needs to be extended. Participation in the system should be mandatory for all appropriate vessels, and the system should be able to control vessel movements where necessary.

Finally, another important means of controlling tanker spills adjacent to sensitive areas is to create tanker free zones. The Alaska Oil Spill Commission has recommended that tankers in transit from Alaska to the lower 48 keep at least 100 miles off the coast. This kind of approach should be explored for other areas of the country as well.

Thank you, Mr. Chairman.

[The prepared statement of Ms. Chasis follows:]

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TESTIMONY

OF THE NATURAL RESOURCES DEFENSE COUNCIL

ON

OIL TRANSPORTATION SAFETY

BEFORE THE SUBCOMMITTEE
ON TRANSPORTATION, AVIATION AND
MATERIALS OF THE U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

May 24, 1990

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Mr. Chairman, Members of the Committee, the Natural Resources Defense Council (NRDC) appreciates this opportunity to testify. We appreciate your efforts to keep Congress' and the public's attention focused on an issue of crucial importance, namely oil transportation safety. It is now more than a year since the catastrophic Exxon Valdez oil spill. Yet the most important measures to avert a similarly catastrophic spill still have not been put in place. The nation's ports and harbors are a ticking time bomb just waiting for another disaster to happen.

Two days before the first anniversary of the Exxon Valdez spill, NRDC published a report entitled "No Safe Harbor: Tanker Safety in America's Ports" which examined our nation's vulnerability to another major spill. The report looked in detail at three of the nation's busiest harbors: San Francisco, New York and Los Angeles. We found that because of the size of tankers entering these ports, the history of spills, groundings and collisions in each and the lack of adequate prevention measures, an Exxon Valdez - size spill could occur in each of these harbours and cause massive damage to resources used and enjoyed by millions of Americans. I would like to summarize for you today the most significant findings and recommendations of that study.

1. Major Tanker Spills Are Not Uncommon.

Major tanker spills are by no means unusual events. Although estimates vary, approximately 80-91 million gallons of oil spilled into U.S. waters from 1980-1986. Roughly half to two thirds of this came from oil tankers and barges.

From 1980-1988, tankers in the U.S. were involved in 468 groundings, 371 collisions, 97 rammings, 55 fires and explosions and 95 deaths.

Since 1978, there have been 213 tanker and barge spills of more than 10,000 gallons each in U.S. waters -- an average of 18 per year. Of catastrophic U.S. marine spills (exceeding one million gallons) since 1976, all eight were the result of tanker accidents.

Since 1984 there have been two major oil spills (involving more than 100,000 gallons) in and around San Francisco Bay: 1.5 million gallons from the tanker Puerto Rican and 420,000 gallons from a Shell oil storage tank. Coast Guard records reveal that in 1988 there were 417 smaller oil spills of varying size in the Bay, half from vessels. There have also been a troubling series of near misses within San Francisco Bay. For example in December 1989, the American Trader, the same tanker that spilled nearly 400,000 gallons of oil off Los Angeles Harbor in February 1990, had a potentially disastrous docking accident in San Francisco Bay when it struck another tanker unloading oil while trying to dock at the Chevron Refinery in Richmond. In April 1989, just one month after the Exxon Valdez spill, one of the largest ships allowed in the Bay, the Overseas Juneau, crashed into the same Chevron pier in Richmond while carrying 17 million gallons of Alaskan crude. According to the crew, the ship narrowly missed puncturing its hull and spilling crude oil into the Bay.

Oil spills occur daily in New York Harbour, with often two or three spills occuring in one day. Over the last 13 years at least 15 large oil spills have occurred in the harbor, dumping at least 2.4 million gallons of oil. At least 10 of these were spills from barges. Groundings caused five of the spills. Everyday an average of four tankers each carrying an average of 13 million gallons enter the harbor. These tankers travel through areas notorious for groundings and through areas with risk of collision. The threat of a very large spill similar in size to the Exxon Valdez exists throughout the harbor.

Los Angeles Harbor (also known as San Pedro Bay) is approximatley 20 miles south of Los Angeles. Within it, the ports of Los Angeles and Long Beach lie side by side. Supertankers carrying 33 million gallons of Alaskan crude oil regularly enter the harbour. If one of the supertankers ran aground or had a collision, a spill similar in size to the Exxon Valdez could devastate the region. In fact, on February 7, 1990, the largest oil spill in southern California in the past ten years occurred off Huntington Beach, just outside Los Angeles Harbour. Nearly 400,000 gallons of Alaskan crude oil were spilled when the American Trader impaled itself on its own anchor when attempting to moor at an offshore marine terminal. Oil came on shore affecting approximatley 15 miles of beach. Newport Beach and Huntington Beach were the hardest hit. The oil was four inches thick on Newport Beach on day four of the spill.

2. <u>The Ability to Effectively Cope with Major Tanker Accidents is Severely Limited.</u>

The record of oil spill containment and clean up is nothing less than dismal. Only 10-15% of spilled oil is typically recovered; in Prince William Sound, less than 10% of the 11 million gallons of spilled oil has been recovered, despite Exxon's $2 billion clean-up efforts to date.

The reason lies in part with primitive technology and in part with a chronic inability to mobilize people and equipment under the chaotic circumstances that surround a major emergency.

On the operational side, sufficient response equipment is not always readily available and there are often not enough experienced people available to deploy it effectively. On the technology side, current spill containment and clean-up equipment quickly become inoperative in anything other than calm weather and seas. For example, most booms lose effectiveness when wave heights reach three to four feet and currents exceed one knot. Waves and offshore waters used by tankers heading for port often exceed these levels and currents in New York Harbour, San Francisco Harbour and other ports regularly exceed one knot. Heavy winds can literally lift light weight booms out of the water, rendering them useless. Skimmers also lose effectiveness with increasing wave height, with one to five feet the operational limit for most. Dispersants have demonstrated low effectiveness in actual spill situations, and some of them are toxic to marine life. When they work, they mearly shift the location

of the spill impact from the surface to the water column and the ocean bottom.

3. Spills have devastating impacts.

Oil and related refined products are extremely toxic at very low concentrations to a wide variety of marine organisms. In addition to killing birds, fish, sea otters and other animals out right, oil can exert "sub-lethal" effects, including reduced growth, altered feeding behavior and lower reproductive success.

The known toll from the Exxon Valdez spill includes 33,000 dead birds, more than 1,000 dead sea otters, closed fisheries, and more than 13,000 miles of oiled shorelines and this represents only a portion of the animals harmed. Preliminary results of the first year of data collection by the federal and state governments point to the following: a much higher rate of abnormalities in herring larvae hatched from eggs collected near oiled shorelines in Prince William Sound as compared to unoiled areas; in salmon streams where normally tens of thousands of eggs or juvenile can be found, not even a single egg or fry; impacts on deep-dwelling creatures such as rockfish; and significant effects on peregrine falcon nesting and reproduction.

There have been significant wildlife deaths associated with other major spills as well: for example, 62,000 pounds of tainted fish as a result of the Glacier Bay spill in Cook Inlet, July 1987; over 10,000 birds of 26 different species killed as a result of the Apex Houston spill off Central California, February

1986; 10,000 birds killed as a result of the NESTUCCA oil spill off the State of Washington, December 1988.

4. Prevention is the best response

The limitations on responding adequately to oil spills argue for making every effort to make sure that they do not occur in the first place. The main areas of opportunity are double hulls and bottoms, better pilotage, navigational aids and minimizing tanker transport in sensitive areas. Shockingly, very few of these preventive measures have been put into place despite the fact that it is more than a year since the Exxon Valdez spill.

a. Double hulls/double bottoms.

Many experts believe the single most important step that can be taken to prevent oil spills is to require oil carriers (tankers, bulk oil carriers and barges) to have double bottoms and double hulls. Double hulls are required on vessels carrying hazardous chemicals and liquified flammable gasses. This raises the question of why they are not required on oil tankers, since oil is also a poisonous and explosive substance. Currently only 18% or 574 out of 3,255 oil carriers worldwide (10,000 deadweight tons in size and greater) have double bottoms and 16% or 42 of 259 flag carriers (10,000 deadweight tons and greater) have double bottoms.

A Coast Guard study found that had the Exxon Valdez been equipped with a double bottom, the size of the spill would have been reduced by 25-60%. Had the American Trader been equipped

with a double bottom or double hull the February 1990 spill of 400,000 off Southern California would have been prevented or reduced (the single hull vessel apparently ran over its own anchor).

Arthur McKenzie, Director of the Tanker Advisory Center, analyzed the 26 major spills that occured worldwide from January 1982 to June 1989. He concluded double hulls would have prevented or minimized the amount of oil spilled in 16 of them (in four other spills, there was not enough information to make a judgement; in the six remaining, the spills were caused by problems in transfer operations and a double hull would not have made a difference).

Similarly, a 1973 Coast Guard analysis found that double bottoms would have been effective in 96% of the cases examined, preventing spillage of 3.4 million gallons of oil.

The oil industry and oil shippers make several claims in lobbying against double bottoms and double hulls all of which are rebuttable.

Industry Claim: Flooded double bottoms make ships more difficult to rescue, increasing the risk that the vessel will sink and the entire cargo will be lost.

Response: Many other ships have double bottoms and have not experienced adverse affects in groundings due to the double bottom. The Office of the Supervisor of Salvage of the U.S. Navy

said the probability of a major salvage or pollution incident growing out of the grounding of a single bottom tanker is an order of magnitude greater than for a double bottom tanker.

Industry claim: Double bottoms/double hulls increase the cost of tanker construction and operation.

Response: The recently released Alaska Oil Spill Commission Study found that U.S. shipbuilders could build a double hull tanker the size of the Exxon Valdez for an incremental cost of 10% of a single hull vessel. The Tanker Advisory Center estimates the effect of a double hull requirement on oil import costs to be $0.0038 cents/per gallon. Most significantly, the costs of a major oil spill -- the financial cost of the Exxon Valdez is $2 billion and mounting -- would pay for the incremental cost of building 100 or more tankers with double hulls.

Industry claim: A U.S. statute requiring double hulls would conflict with international law and unfairly hurt U.S. shipping interests.

Response: The international conventions on ship pollution allow countries to adopt more stringent standards so there would be no violation of international law. The requirement for double hulls would fall on all oil carriers entering U.S. waters, whether foreign or domestic. So U.S. shipping interests would not be

disadvantaged. Since 28% of the foreign flag tanker fleet enters U.S. waters each year, a U.S. requirement for double hulls would have benefits worldwide.

Because of the Coast Guard's failure to impose a double bottom/double hull requirement, despite the overwhelming evidence, it is imperative that Congress impose the requirement on both new and existing tankers and barges, leaving no opportunity for the Coast Guard to waive such a requirement.

b. Improved Pilotage

There are two kinds of licenses required for pilots of vessels using U.S. ports: federal licenses issued by the Coast Guard for pilots of vessels for domestic trade; and state licenses for pilots of vessels in foreign trade. Federal regulations are inadequate in several respects. For example, someone can obtain a license to pilot a supertanker such as the Exxon Valdez based on experience on vessels only a fraction the size; and licensed pilots are not required for self-propelled vessels under 1,600 gross tons or barges under 10,000 gross tons -- significant exemptions, since vessels of this size carry large amounts of oil, and barges in particular account for many spills.

Federal regulation of pilotage has been under almost continuous review and revision for the past decade. The Coast Guard has proposed many changes in its regulations, then after numerous and lengthy hearings, has adopted some but abandoned or watered down others. In Congress, bills relating to oil spill pre-

vention, response and liability strengthen federal pilotage requirements related to alcohol and drug abuse. However, no other significant improvements in pilotage are called for under either the House or the Senate bills.

Enforcement at the state level varies tremendously from state to state with some state pilotage boards seriously failing in their responsibility for oversight and discipline. According to a Congressional report, disciplinary action was taken by state pilotage boards in only 19 cases out of 390 cases referred by the Coast Guard in a 27 year period. A few years ago, a Liberian vessel with a Florida pilot collided with a bridge in Tampa Bay causing 35 deaths and great property damage. The National Transportation Safety Board (NTSB) found that the pilot's acts or omissions were the probable cause of the accident. The state board, nevertheless, found him free of fault and took no action. The Florida board had not disciplined a pilot in five years, a period in which it had considered 239 cases, half of them involving accidents in Tampa Bay. The NTSB recommended that the federal law be changed to enable the Coast Guard to act against a pilot's federal license for acts committed under the authority of a state license.

In February 1988, the British tanker Maersk Neptune, loaded with gasoline, rammed an anchored vessel in upper New York Bay. The pilot was operating under the authority of his New Jersey license, but also held a federal license. The NTSB found that the probable cause of the ramming was pilot error. It also

reported that the pilot had been involved in seven prior accidents and in each case had been cleared of wrong doing by the New Jersey board of commissioners. In his eighth accident, the ramming, the board suspended him for six months, temporarily reduced him one grade and fined him $100.

There is a need for reform at both the federal and state level of the regulation of pilotage. In July 1989, the Commandant of the Coast Guard appointed a pilotage study group consisting of Coast Guard officers and civilian personnel to study federal pilotage rules and submit recommendations. Its study was issued for public comment in November 1989. Among the recommendations were the following: the Coast Guard should be authorized to extend pilotage waters from 3 miles to 12 miles; licensed pilots should be required for tank vessels over 50 meters (164 feet) in length when under way in pilotage waters; service, training, testing and other requirements should be strengthened. Federal reform, however thorough, is not sufficient, so long as the states have a free hand to regulate pilotage and foreign trade. A thorough, professional and objective review of state pilotage laws and regulations should be undertaken, completed and implemented without delay. State pilotage boards need to become more active in their oversight and disciplinary proceedings and there needs to be more public representation on the boards and more open proceedings.

c. Navigational Aids

Vessel Traffic Service (VTS) systems help guard against tanker groundings and collisions by determining the position of vessels through such means as radar surveillance and vessel radio reports. They also alert vessels to potential navigational hazards and the position of other ships. Unfortunately, the Coast Guard has such systems in place in only five harbours in the country: San Francisco, Prince William Sound, Puget Sound, Houston/Galveston and Berwick Bay Louisiana. In addition, Congress has authorized the revival of the New York Harbour VTS system which will be partially operational in the summer of 1990.

Unlike air traffic control systems, participation in the VTS is not always mandatory for all vessels. In addition, the systems are passive. The Coast Guard advises ships of their position relative to other ships and navigational hazards but does not control their movements. Also VTS systems do not always cover the full port area. For example, in San Francisco five of six major oil refinery docks are located outside the VTS radar coverage.

VTS systems need to be expanded to cover additional ports and harbours and to expand their geographic radar range within harbours. Participation in the VTS system should be mandatory for all appropriate vessels, and the VTS should be able to control vessel movements where necessary.

d. Tanker-Free Zones

A means of eliminating tanker spills in sensitive areas is to create tanker-free zones. The Alaska Oil Spill Commission has recom-

mended that tankers in transit from Alaska to the lower 48 keep at least 100 miles off the coast. This kind of approach should be explored for other areas of the country as well.

Conclusion: Mr. Chairman, Members of the Committee. It is absolutely imperative that the preventive measures we have discussed be imposed as quickly as possible. We know what needs to be done to avert the occurrence of another major oil spill. We must exercise the political will to implement these measures immediately.

Thank you.

Mr. TORRICELLI. Thank you very much. It's been very helpful.

Mr. Noble, Mr. Bergeson, or Mr. Keith, has anything occurred in practical experience of shipbuilding design that convinces you that the previous studies conducted with regard to double hulls and double bottoms are no longer accurate in any detail?

Mr. Keith?

Mr. KEITH. Mr. Chairman, I think this was alluded to by Lloyd, here. It bothers me that the Congress, under Title 46, requires a double hull and double bottom on our very most dangerous ships, our LNG ships that we're talking about— required by law, 231 and 232 under Title 46—and the most dangerous chemical carriers. If you and I were going to go in and carry those chemicals—

Mr. TORRICELLI. I understand.

Mr. KEITH.—in anything but a double hull, they would laugh us out of the building. So it's not a question of effectiveness, it's, do you want to treat oil in the same manner that you do these other carbons?

Mr. TORRICELLI. Has anything happened since the 1975 reports were done to convince you that anything in those reports needs to be amended or changed? Any practical experience?

Mr. KEITH. We just have a lot more experience in constructing double bottoms and I think the record is even more clear now than ever before. We know now that a double hulled ship, with respect to collisions—and this is a beam on 15 double hull that we talked about—is 75 percent effective for tankers over 80,000 tons. With respect to bottoms, that beam on 15 is nearly 90 percent effective.

Mr. TORRICELLI. The 75 and 90 percent are the chances of reduction of leakage?

Mr. KEITH. That's how many oil spills that we now have on a single hulled tanker that would have been eliminated. And you are right. There are some cases, like the Exxon Valdez, which go into the negative column, which would at least reduce that oil spill, which we're not even including.

Mr. TORRICELLI. Mr. Noble, how about this question of gasses building up in between the hulls, or Mr. Bergeson?

Mr. BERGESON. I can say that I think that that man this morning, Mr. Roland, was referring to two Ferguson tankers that disappeared at sea some years ago in the 1970s, and nobody knows why they disappeared.

Mr. TORRICELLI. I see. He's making an assumption that it had to do with the double hull.

Mr. BERGESON. He's making an assumption that is invalid, to the best of my knowledge. I had some knowledge of it at the time.

Mr. NOBLE. Our evidence says that we haven't found any single case of a ship having a double bottom explosion. It's quite possible that has happened, but we don't think that there are any more risks than most of the world's shipping has double bottom that carry fuel in those double bottoms.

Mr. TORRICELLI. I take it, Mr. Bergeson, in the ones that you've constructed, there was monitoring equipment—did you have monitoring equipment to indicate whether there were any buildups just like in the normal hull of a boat?

Mr. BERGESON. Yes. I don't know whether I said that the inner hull was not ruptured. I think—

Mr. TORRICELLI. Mr. Bergeson made it clear that he believes there is absolutely no capacity or technology problem in building these ships domestically. Does anyone disagree with that assessment?

Mr. Keith?

Mr. KEITH. I don't. We looked at that in great detail for the State of Alaska. I think one of the things that has to be done—and I know you're a research subcommittee, a research group—is that I think the thing to do is to come up with a standard design. We heard Conoco talk 15 percent. That is indeed a correct number. But a great deal of that is done in the engineering costs and coming up with that design. If you could get this country, the shipyards together, or the NAS to come up with a standard 80,000, a standard 150 so that that design was approved across the board, then you could drive that cost of the double hulls down to something less than 10 percent.

Mr. TORRICELLI. You don't have any question about the capacity of domestic yards to do the retrofitting or replacement of the vessels?

Mr. KEITH. None whatsoever, sir.

Mr. TORRICELLI. How much cargo space do you think would be lost in a double hulled oil tanker?

Mr. BERGESON. That's another fallacy. People don't compare apples and apples. You have to compare on the basis of cargo deadweight. When we—there is no loss. When we talk about these cost differentials, we're talking about ships with the same cargo deadweight.

Mr. TORRICELLI. That's for new ships?

Mr. BERGESON. Sir?

Mr. TORRICELLI. That's for new ships, but if you retrofitted—

Mr. BERGESON. If you're retrofitting something, under some of the schemes you're going to lose some cargo deadweight.

Mr. TORRICELLI. That's my question.

Mr. BERGESON. Yes.

Mr. TORRICELLI. What are we talking about?

Mr. BERGESON. In retrofitting.

Mr. TORRICELLI. Are we talking about 5 percent, 10 percent?

Mr. NOBLE. We're talking about 10 or 15 percent.

Mr. TORRICELLI. With a new ship, as Mr. Bergeson points out, there's no reason for any net loss?

Mr. NOBLE. That is correct.

Mr. KEITH. I think this is another fallacy, sir. If you start with a ship that's required to have segregated ballast, you have the ballast tanks there so now if you're going to retrofit with a double bottom, what I would suggest is that you use those tanks then as cargo tanks. So you have tanks that are now on the ships that you would at least look at redesignating those to cargo so you could drive that number down to less than 5 percent that you're talking about. Indeed the beam on 15 that we did for the State of Alaska double hull doesn't reduce the cargo carrying capacity by one iota.

Mr. TORRICELLI. Mr. Noble, let me ask you a question and then I'll yield to Mr. Rohrabacher and then I'll return so that some of the people from the environmental groups that I'd like to ask questions.

Hydrostatically balanced loading has been suggested as a safety measure for oil transportation and indeed has been discussed to some length on the floor during our debate. Would you explain this technology some to the Committee and tell me if practical criteria can be developed to allow existing tankers to use it?

Mr. NOBLE. Certainly. Basically hydrostatic balancing is based on partly loading the cargo tanks in such a way that if a hole is pierced in them, the head of the oil in the tank is less than the head of the water outside so that there would be a tendency for water to flow in rather than for the oil to flow out. The problems to applying that to an existing ship are that the ship would lose stability, not necessarily endangering the ship, but less stability because it's free surface on the tanks. There would be difficulties in controlling the loading both in ship's officers and from Coast Guard inspecting it. Those would be variable as a function of the density of the cargo, not oils of the same density. Density of the water would determine how high the tank would be filled. In some cases there may be structural requirements because now the liquid can slosh whereas when it's a full tank you don't have the sloshing.

Mr. TORRICELLI. There is—on this question of retrofitting current tankers, there has been some discussion of using this hydrostatic system has an interim measure before mandatory double hull construction begins. Would you give your assessment of its use on an interim basis?

Mr. NOBLE. I think the hardest problem will be to ensure compliance, whether deliberately trying to get around the system or through mismanagement of cargo loading. I think its very difficult to ensure that those tanks are only partially loaded.

Mr. TORRICELLI. If they did comply, does it offer—

Mr. NOBLE. It will offer some—

Mr. TORRICELLI.—compared with the retrofitting of double hulls?

Mr. NOBLE. It's not as secure. Basically if the rupture extends part way up the hull, there is still some chance of outflow of oil depending on the extent of the rupture, too. It's not a foolproof system. It's an upturned bucket. There's still some chance of outflow.

Mr. TORRICELLI. Does anybody differ on that assessment of it on an interim basis?

Mr. BERGESON. I don't understand your definition of interim. It sounded—

Mr. TORRICELLI. It's an ominous word in this institution, actually. [Laughter.]

Mr. TORRICELLI. At some point a double bottom would be required, but rather than forcing the current fleet to retrofit to double hulls, some of my colleagues who do not share my passion for this requirement, would instead allow the industries to use this technology.

Mr. BERGESON. I think interim approaches of various kinds should be vigorously pursued. I think that's a good function of the Committee.

Mr. TORRICELLI. Are you a believer in this one?

Mr. BERGESON. I don't know. I'm not smart enough to tell.

Mr. TORRICELLI. I doubt that.

Mr. BERGESON. Nor do I have the resources to analyze it. Nor have I—

Mr. TORRICELLI. I doubt that, too.

Mr. NOBLE. I might just add that—

Mr. TORRICELLI. You analyze everything.

Mr. NOBLE. The use of hydrostatic balancing has a significant operator cost penalty in that now a ship that has the same capital cost as it had yesterday, has the same crew cost, the same fuel cost will be carrying perhaps only 70 percent of her cargo.

Mr. TORRICELLI. Well there's not much loss of a cargo.

Mr. NOBLE. It can be as much as—

Mr. TORRICELLI. There's a 30 percent loss of cargo.

Mr. NOBLE. I would say between 15 and 30 percent is what we have anticipated.

Mr. TORRICELLI. Mr. Rohrabacher, I've put you in a terrible position of the pleasure of having been called.

Mr. ROHRABACHER. We have a couple of minutes here.

Mr. TORRICELLI. Would you like to—

Mr. ROHRABACHER. Thank you, Mr. Chairman.

Mr. Keith—double hulling of a ship by eleven feet, what would that do to the center of gravity of the ship and the stability of the ship?

Mr. KEITH. All right. Number one, we start with the same outside dimensions for the ships—inside the ship has the segregated ballast tank. So what we do is we take and we smear that ballast capacity toward the outside, that ballast toward the outside of the ship. What we do when the ship is fully loaded, the VCG of the cargo—in other words the depth of the ship—is the same. So the VCG of the cargo is the same but it's smeared over the entire area. So the answer to your question, exactly, is absolutely nothing. The VCG stays identical.

It's hard for a lot of people to visualize because the inside of a ship, when you look at the existing ship, is a lot of spaces and spaces type of thing and now you're going to smear that out so that the overall cargo VCG is the same.

Mr. ROHRABACHER. Have you seen Captain Turnquist's jumbo barge carrier design at all?

Mr. BERGESON. I haven't seen that, sir.

Mr. ROHRABACHER. If you get a chance, I'd like your reaction to that. Basically it's not a LASH ship—it's the same thing—it's a ship where it sinks down and the barges float on and off rather than a LASH ship where it's brought on by a crane or whatever. It seems to me that that is the ultimate in double hulling design plus it permits these barges to be loaded with oil, oil hauled one way and another cargo hauled another way. So I'd like your opinion of that and my staff will try to get you that.

Mr. LLOYD. Fine, sir.

Mr. ROHRABACHER. Although, as we just heard, it sounds like barges have had not a very good record, I'd like to know more about that as well.

One question for—I guess I'll have to ask this of Rich — when we hear about all this—Bechtal, Mr. Bechtal—when we hear about all of the accidents that tankers have had which have been documented here, does this give you some second thoughts about, again,

about off shore oil drilling? The fact is that we've had off shore oil drilling all of this time—I know in my area we've had off shore oil drilling and had no accidents. What's happened—the only accidents that we've had has been with a tanker. I'm beginning to think that perhaps the environmental movement should take a second look at this whole issue of off shore oil drilling if it ends up making us more dependent on tankers.

Mr. OLSON. I'll have one answer, and I think that maybe Sarah has some additional. The largest oil spill, to my knowledge, that's ever occurred was from the IXTOC oil platform in the Gulf of Mexico.

Mr. ROHRABACHER. How long ago was that?

Mr. OLSON. That was in 1978, I believe.

Mr. ROHRABACHER. Was that an American-run operation?

Mr. OLSON. It was a Mexican company—PEMEX, although a lot of the technology was from American companies.

Mr. ROHRABACHER. I'm told about that particular spill that that was not run by American companies and they didn't have the technology that was—that our current off shore oil wells have.

Mr. OLSON. The litigation afterwards, a lot of it, focused on some of the American companies that had provided a lot of the technology. I think Sarah probably has some additional thoughts.

Ms. CHASIS. Yes, our organization has had a long history of concern about off shore oil development and in our report, we looked at this question. In fact, from the proposed plans for oil drilling that have been put forward, we see the Interior Department itself saying there's going to be a significant increase in tanker traffic. In other words, a lot of the proposed off shore oil development will not be serviced by pipelines, but by tankers.

So, for example, we say that if Federal plans to lease the areas for oil drilling off shore in Mendocino and Humboldt counties wins approvals, the Department of Interior predicts that another 250 oil tankers will enter San Francisco Bay each year, a 24 percent increase over current traffic loads.

Mr. ROHRABACHER. But if—in my area, for example, they're talking about piping it in. You would think that piped in oil from off shore oil development would be a safer method than, let's say—the Exxon Valdez, by the way, was headed towards my district. I want you to know that. If that captain would have had his accident down in my area, we would have had oil from Santa Barbara Coast all the way down to Mexico and it would have been a disaster. The spill that we had was one tenth of what the Exxon Valdez spilled. So, I'm very aware of this and I'm serious about it. I think it's possible that it might be better to get that same amount of oil from an off shore oil rig if it's piped in rather than get these ships floating all over the place.

Ms. CHASIS. There have—I think pipelining, generally, is considered safer. Certainly, there have been some disturbing recent problems with pipelining, particularly in the Gulf of Mexico. The pipelines that were buried starting to surface and fishing vessels rupturing them with their anchors—

Mr. ROHRABACHER. Not to mention the Arthur Kill in New Jersey.

Mr. CHASIS.—and then the Arthur Kill spill in New Jersey where over 500,000 gallons were spilled. So I think one has to be cautious about that.

Mr. ROHRABACHER. Okay.

Thank you very much, Mr. Chairman.

Mr. TORRICELLI. It appears that the same lapse of attentiveness that a ship captain who is returning from a bar can have, so too can an operator who is in charge of a valve on a pipeline who doesn't even hear the bells going off that are warning him.

Mr. KEITH. I had one last thing that Mr. Parker wanted me to pass on to you, so I thought I should. He wanted just to bring it down into perspective. If we took the double hulled tankers that you're now proposing for the State of Alaska, and we passed that on as the price per gallon for doing business—he had run the numbers at a 12 percent interest rate return in addition for 15 years—it's one tenth of one cent per gallon for double hulls as opposed to single hulls. He said that he for one would go on record as willing to pay that tenth of a cent and he was hoping other people would join him.

Mr. TORRICELLI. That is a very useful piece of information. What you might do is direct that in a letter to the Committee as well. I would like, at some point in the future debate be able to hold that up, if you'd be so helpful.

Mr. KEITH. We're going to leave the entire report with Mr. Frost, and it's shown in here.

Mr. TORRICELLI. Fine.

Thank you all for your testimony. You've been extremely helpful. Let me just say to those of you from the environmental community, too, your testimony today has been very helpful. I hope you are also as vocal and as evident to members of the Conference Committee now, and that you are heard on this issue because we largely, as one of the two authors of this provision on the floor of the Congress, had to handle this ourselves. We did not have the kind of help from the environmental community I actually would have liked, frankly. Now is your opportunity. Please meet the challenge.

Thank you for joining us. Thank you for each of your testimonies. It's been extraordinarily helpful and I greatly appreciate the enormous effort that went into preparing this testimony. We learned an enormous amount about it. There will be other hearings in the future based on some of the ideas that came forward here. You will see some of them developed into legislative proposals, and I'm very grateful to you.

[Whereupon, at 12:54 p.m., the subcommittee was adjourned, to reconvene at the call of the chair.]

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